

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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The Bethlehem Furnace.

The advantages of gas-heated reverberatory furnaces for metallurgical uses over those heated by solid or raw fuel, are so great as to have led to their adoption by many manufacturers, notwithstanding the loss incurred in the abandonment of the old forms and the heavy additional expense of the forms of gas furnaces adopted. In most cases, however, these items of expense and loss have been so considerable that they have kept ironmasters from using gas, and they have therefore retained the old form of puddling and heating furnaces, but at the same time have looked for some invention that would allow of the use of gas and not render valueless the immense sums invested in these old furnaces. We give in the accompanying cuts such a device, the invention of Mr. William Stubblebine, of Bethlehem, Pa., who has been superintendent of the iron mill of the Bethlehem Iron Company. The invention is simply an improved combustion chamber for these old furnaces, and which at a trifling cost can be attached to them and secure the economic use and combustion of fuel.

Before describing it, a few words about the method of combustion in the common reverberatory puddling and heating furnaces will not be amiss. As is well known, the product of combustion, when the air first comes in contact with the lower layer of fuel next the grate bars, is carbonic acid. This carbonic acid, in passing through the upper layers of fuel, takes up carbon and becomes carbonic oxide.

Many attempts, with varying degrees of success, have been made to burn the carbonic oxide either in the upper part of the fire-box or while passing through the heating chamber. The actual measure of success or failure thus gained is best shown by the trifling extent to which these various devices are utilized. They have failed to combine thorough combustion with desirable qualities of flame, and hence have been discarded.

Mr. Stubblebine, however, first brought into use the process of mixing a portion of the gases from the fire-box with the upper blast, and then discharging this mixture into the fire-box through properly proportioned and suitably arranged orifices.

The accompanying illustration will convey to the reader a clear idea of the form, arrangement and position of this gas-mixing chamber. The arrows show the direction of the blast and currents of gases. The theory of the mixing current is that the current of gas in the furnace over the bridge and toward the flue draws the upper blast to the front orifices in the floor of the mixing chamber, and the volume of the blast being insufficient to fill all these orifices, the action establishes an induced current of gases from the fire-box, up through the holes next to the furnace doors. The mingling of the gas and blast takes place, without combustion, in the mixing chamber, which possibly helps to counteract the evil of undue dilution by the nitrogen of the air, as is the case when combustion takes place at the first instant of contact. The perforations through the roof of the fire chamber shown in section in the longer sketch, Fig. 1, and in plan section L. D., Fig. 2, are made 2½ inches in diameter, and placed about 8 inches apart from center to center in four rows across the furnace. Two rows of these holes are in front and two in rear of a bridge wall built, as shown, fully across the mixing chamber. The ceiling of the mixing chamber is made solid over the rear half of it, and is filled with small holes ¾ of an inch in size and ¾ of an inch apart in the front half. Above this ceiling of the mixing chamber is a smaller chamber into which the blast is admitted, being preferably projected to the rear so as to break the force of the blast and diffuse it throughout the inclosed space, and make it pass down through the small holes uniformly distributed.

Under conditions favorable to working, the upper blast is forced with a gentle current into the fire-box, so that there is no surplus oxygen in the lower layers of the furnace flame, into which it would be carried by a more forcible blast down through the furnace, and by which it would be brought in contact with the metal charged and cause furnace waste. The lower blast is controlled to secure the greatest production of carbonic oxide, and by the gentleness of its current prevents the transfer of dirt from the grate to the heating chamber, thus keeping the iron purer, and securing thereby materially better quality in the product. Experience in puddling proves that the quality of puddle bar from this furnace, as compared with that from similar furnaces without this process of combustion, is much better.

This way of working the furnace secures a clean fire, there being less dirt in it after six or seven heats than there is often in three or four heats when the improvement is not used, and consequently avoiding the necessity of withdrawing the grate bars, as frequently is the case otherwise. The combustion being very rapid, secures as a result a more intense heat than otherwise would be the case, and yields the important advantage of localizing the high temperature.

In existing heating furnaces provided with this improvement, the piles charged next to the flue are ready to draw as soon as those near the bridge, and new furnaces must be built longer than those now in use, or with a reduced area of grate, before the full benefit to be gained in utilizing this process of com-

bustion can be ascertained. The improvement has been thoroughly and exhaustively tried at the works of the Bethlehem Iron Co., and the records of their working show that while their single puddling furnaces produced an average of about 2200 pounds of puddle bar before the improvement was put on the furnace, they have since then averaged about 4200 pounds of puddle bar each turn. The record of their double puddling furnaces shows an increase, under like conditions, of from 4800 to 8000 pounds; and this result has been obtained with a reduction of coal consumed per ton of product of fully 33 per cent. Further, the quality of product has been greatly improved, while reducing the amount of furnace waste and increasing the life of the furnace. The cost of adding this improvement to existing furnaces will vary somewhat, depending on the peculiar surroundings of such furnaces, but may be estimated in a general way at \$35; and we are informed that this furnace improvement is controlled by Mr. B. C. Lauth, of Philadelphia, a gentleman whose experience in, and knowledge of, iron manufacture are sufficient guaranty of the value of the invention.

The Belgian Exhibition.

An International Exhibition of the Arts and Industries is to be opened at Brussels on the first of next May. Although this exhibition will be designed after the fashion of the great international fairs by which it has been preceded, it will differ from them in two important particulars—it will be as permanent as its fortunes will allow, and it will be arranged with a sole view to commercial profit. So far as can be judged from the circular which has been issued, the idea seems to be to make this exhibition a huge market, where the wares of the world will be on sale. Exhibitors will be required to pay rent for each square meter (3 feet 3 inches) they may desire to occupy. They must take the risk of any loss caused by fire or other accident. The managers of the

ages of a value of 50 francs or less, 11 francs, or about \$2.09, and on packages of a value from 50 to 200 francs, 16 francs 50 centimes, or \$3.14.

METALLURGICAL NOTES.

DRY OXIDE CINDER BOTTOMS FOR HEATING FURNACES.

While sand bottoms have long been displaced in the puddling process, they are still used in heating furnaces, although much attention has been given to cinder bottoms. In England much iron is double heated, the first heating being done on a cinder bottom, so as to secure the wastage or cinder for fettling purposes, while the finishing or welding heat had to be carried out on a sand bottom, because it was found difficult to secure a cinder bottom sufficiently dry or hard in the high heat required for welding. Mr. J. Tibbs, of Tipton, England, after much experimenting came to the conclusion that the chief cause of former failures was that the cinder flowing from the

Herr Von Kerpely's report of the Paris Exhibition, published in 1879, the following list of the Bessemer and open-hearth steel works of that country:

BESSEMER WORKS.				
Name	No. Converter.	Capacity, Tons.	Output, Tons.	
Denain	2	8 to 9	30,000	
Montluçon	4	.....	10,000	
Châtillon-Commentry	4	.....	.....
Bessèges	3	.....	25,000	
St. Etienne	2	.....	10,000	
Terrenoire	4	4 to 5	25,000	
Givors	4	5 to 6	.....
Assailly	1	7 to 9	40,000	
Creusot	6	8 to 10	.....

OPEN-HEARTH WORKS.				
Name	No. Converter.	Capacity, Tons.	Output, Tons.	
Bessèges	4	.....	12,000	
Châteauesque	4	.....	.....
Terrenoire	7	5 to 6	.....
Terrenoire	2	10 to 20	.....
Firminy	10	.....	18,000	
Creusot	6	5 to 20	.....
Montluçon	1	.....	2,400	
Châtillon-Commentry	5	.....	.....
Tamais	2	.....	6,000	
Sireuil	1	.....	.....
Aubin	1	.....	.....
Assailly, Pernot	2	.....	.....
St. Chamond, Pernot	3	10 and 20	.....
Denain, Pernot	3	8 to 9	.....

Though incomplete, this list shows that the capacity of the French works is probably in excess of the current requirements of the country.

COMPOSITION OF THE HOERDE CINDER.

When, in the issue of *The Iron Age* of January 22, we published the data relating to the famous Hoerde experiments, the figures for the analyses of the cinder produced during the process were not at hand. As they have an important bearing upon the process and will aid very considerably in judging its value, we give them below. The first two, a and b, belong to charges not specified; the third, c, being the average of the cinders of charges 67, 68 and 69, the full details of which are given, and which are completed by this analysis:

HOERDE CINDER.			
	a.	b.	c.
Silica	9.50	13.81	11.10
Phosphoric acid	9.76	7.38	12.43
Magnetic oxide of iron	9.28	6.92	11.25
Protoxide of iron	6.16	6.20	4.49
Lime	50.35	57.85	50.21
Magnesia	5.01	6.93	9.84
Sulphide of calcium	6.87	6.22	1.15
Alumina	.....	.....	.....
Total	99.93	100.72	100.38

TOOL STEEL AND THE OPEN-HEARTH PROCESS.

A branch of steel manufacture that appears to be gaining ground is the manufacture of the harder varieties of steel for tools, &c. Some of our Pennsylvania open-hearth works are now producing metal of this class which, it is thought, will actively compete with the product of the crucible steel works. For these classes of steel, of course much more pig iron must be used in the open-hearth furnace, and the successful production of high grade material will naturally depend very largely upon the purity of the pig used, for the very best brands of which it would open a market. It would seem that some of our manufacturers have been turning to Sweden for a supply of pig metal which, it is claimed, must be very low, notably in phosphorus. Dannemora, among other works, is capable of sending metal running as low as 0.025 per cent. of phosphorus, a figure which, few, if any, of our domestic pig approaches.

FERROMANGANESE IN PUDDLING.

Prof. Kerpely states that at Fourchambault, in the Department of Nièvre, France, ferromanganese has been used in puddling. They have succeeded in making, from ordinary coke pig, wrought iron which is equal in every respect to that made from charcoal pig.

The New Western Steamer, The Iron Age.

One of the finest steamers on the Western waters has just been completed and christened *The Iron Age*. The steamer is built for Gray's Iron Line, so well known on the Ohio and Mississippi. Neither pains nor expense have been spared to render her as near perfect as can be. She is of easy model and sits as graceful as a duck on the water. She is 175 feet long, 32 beam, 5½ hold. Her machinery is of the very best; cylinders, 22 inches in diameter, 8 feet stroke; five boilers, 26 feet long, 40 inches diameter and furnished with nigger engine and boiler; three steam capstans, fire pumps and everything else to make her complete. She has an electric light of the Brush type, the first ever put on any boat at Pittsburgh. The steel boilers were tested and stood a pressure of 240 pounds and were allowed 160 pounds steam. She has a cast-steel shaft 11½ inches in journal, 28 feet 2 inches long, made by the Nashua Iron and Steel Company, Nashua, N. H., which is a splendid piece of workmanship, being the third shaft made by that company for Gray's Iron Line, all of which have given great satisfaction. Capt. Gray was the first to introduce boilers with drilled holes, first to introduce steel boilers on the Western waters, and first to introduce barge transportation from Pittsburgh for general use, and has made Gray's Iron Line one of the foremost transportation lines of the West.

The gross amount of iron ore mined in Essex County, N. Y., last year was 240,344 tons.

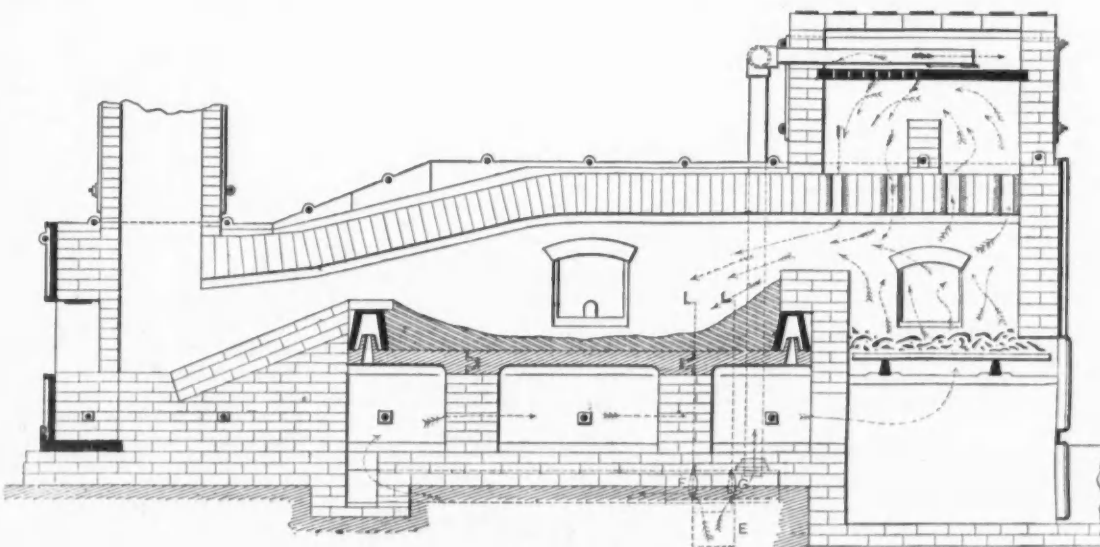


Fig. 1.—Vertical Section.

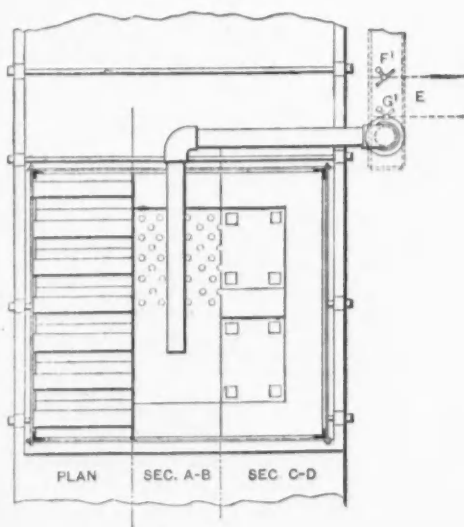


Fig. 2.—Plan and Horizontal Section.

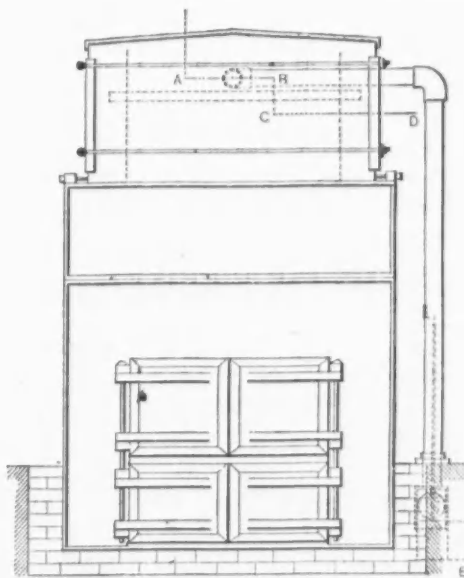


Fig. 3.—Side Elevation.

THE BETHLEHEM FURNACE.

The arrangement of devices for applying the invention to other kinds of furnaces has been worked out, and it is expected to try the improvement at an early day on locomotives and furnaces of stationary and marine boilers, forge fires, reducing furnaces, open-hearth steel furnaces, &c. Other devices for securing the mixing of gases with the blast have been invented to make the process available under the varied conditions which may be presented for solution; and, as a comprehensive name of general application is desirable—one covering the contemplated diversity of devices—the inventor has christened his applied invention the Bethlehem Furnace.

Railway Extension in Austria.—The reports of railway extension during 1879 in various countries are gradually coming in. The figures which thus come to us show how insignificant extensions abroad have been, compared to the development we are accustomed to witness in this country. According to the *Railroad Gazette* 94 miles of new railroad were opened, on eight different lines, the longest of which was 24 miles in Austria-Hungary. About 49 miles were in Austria and 45 in Hungary. At the close of the year the whole country had 11,348 miles of railroad in operation. The increase in 1879 was the smallest for 14 years. The flush times of railroad building there were about the same here, from 1868 to

1873, during which six years 5756 miles were opened, while in 1871, and also in 1872, 1322 miles were built. In the six years since 1873 the total built has been but 1790 miles. The country is not by any means well provided with railroads.

The Belgian Government has made arrangements for the transportation of packages of 10 pounds or less, not exceeding a value of 200 francs, from Belgium to all parts of the world, at greatly reduced rates. The freight on such packages sent via Antwerp to any port of America will be: On packages without value, 5 francs 50 centimes, or about \$1.05, and on packages of 200 francs or less value, 8 francs 10 centimes, or about \$1.54, to which will be added the expenses on packages of value (for the declaration and entry at the Custom Houses of the United States, of which the agents the Red Star Line will take care,) viz., on a ck-

due pole had not been protected against the chilling caused by exposure to currents of cold air, and he accordingly constructed around the orifice through which the cinder issues, a chamber which keeps the cinder in a liquid condition. By this expedient he has secured a dry sloped cinder bottom, which makes a pure flue cinder available for the puddling furnace, while it does away with the trouble and expense attending the use of sand bottoms, there being no sand cracks or marks on the product turned out, while the work of the heater is less laborious. In altering a furnace in accordance with Mr. Tibbs' modification, his representative, Mr. E. G. Scovil, 3 Mile P. O., St. John, N. B., suggests putting in cast iron plates 7 to 8 inches below the fire plates. These plates are made to slope toward the back wall, and from the bridge to the back flue jamb, where a cinder spout is placed when practicable. This spout enters into a close chamber containing a tapping wagon, so arranged that it can be withdrawn and replaced without delay. The bottom is melted in with ground iron ore such as used for fettling. It uses from 1 to 2 cwt. of ore per ton of heated iron for repairs, the wastage from the iron running off with the melted ore, and forming a pure cinder available for fettling.

THE STEEL WORKS OF FRANCE.

As there appears to be little known of the number of the steel works in France and their equipments, we have compiled from

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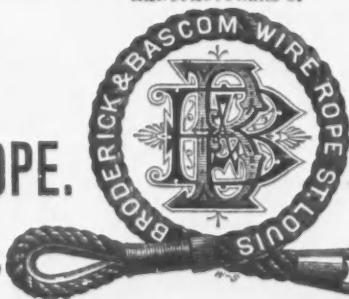
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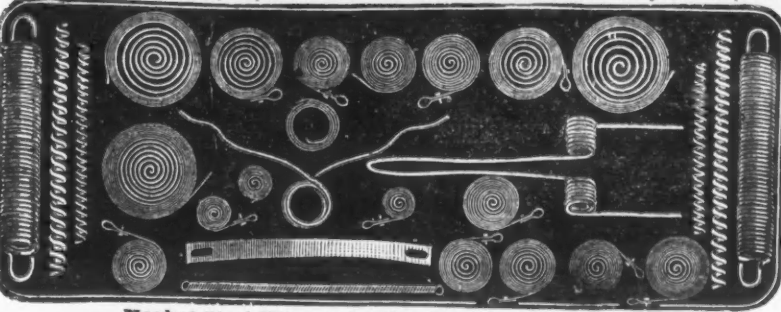
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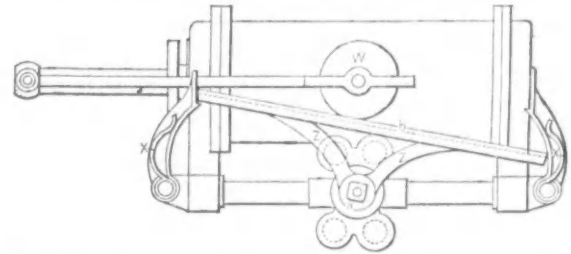
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A German Water Meter.

A German firm of instrument makers in Altona, near Hamburg, have had in use in their works for some three years a water meter which has several points of novelty in its construction. It is the invention of Mr. Dennart, a member of the firm of Dennart & Pope, the manufacturers. The machine is a piston meter, in which the motion of the valves is almost instantaneously accomplished by means of a weight. The external form is shown in Fig. 1. The ap-

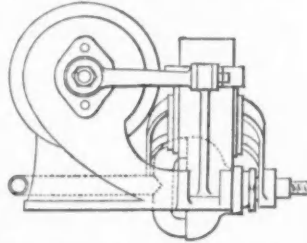
This is a very good test for any meter. The most difficult one, however, for a meter of this kind would probably be to run on a very small stream with a variable head. If a meter can stand this test after it has been some time in use, it would appear to have met some of the severest requirements successfully. We have not heard the particulars in regard to tests of the meter illustrated, and hence cannot form an opinion in regard to its value. The makers intend to use the same apparatus as a motor for small power, and



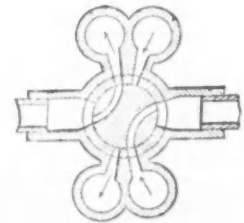
A German Water Meter.—Fig. 1.—Side View, showing the Valve Motion. W, the Weight, b, Bar on which the Weight moves. Z Z, Side Connections between Cock a and Bar b, X, Spring and Stop.

paratus consists of a cylindrical vessel, having a piston moving in it, as shown in Fig. 3. A cross-head fixed to the piston rod gives motion to a weight, W, which rolls on an inclined bar, b, connected to the cock, details of which are shown in Figs. 4 to 7. It will be at once seen from Fig. 1 that, when the piston reaches the end of the stroke, the frame carrying the roller W pushes back the spring X, the end of the bar b on which the

recommend it for this purpose on account of its simplicity and consequent small cost. Where high-pressure water is available at a reasonable price and small powers are only occasionally required, this apparatus may prove an efficient and suitable substitute for other small motors; it requires no preparation whatever, is noiseless and measures its own consumption, according to which payment will be made to the water companies.



A German Water Meter.—Fig. 2.—End View, showing Cross-head.

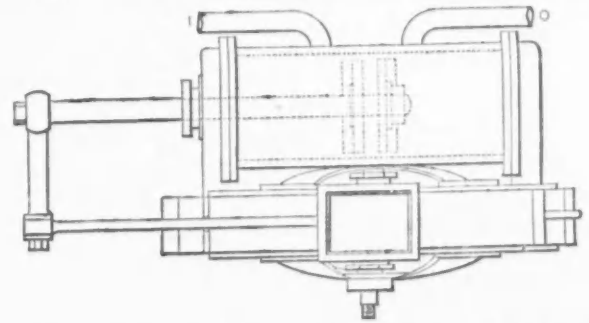


A German Water Meter.—Fig. 6.—Vertical Section at Right Angles to Fig. 5, showing Ports and Passages, and Direction of Flow.

roller is resting then drops, and the cock is reversed instantaneously; thus at each stroke a quantity of water equal to the volume swept through by the piston is discharged, and an accurate measurement of quantity is thus obtained. The piston is packed with leather, the plug of the cock working in a lignum vitae bush, and is quite cylindrical. In the meter now working at Altona, during the term of three years both piston and cock have proved perfectly tight. The cock being ar-

The recording apparatus is not shown. The meter will have an abundance of power to run any style of counter which may be applied to it.

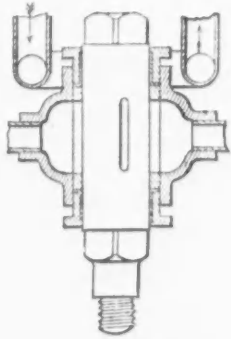
Knights of Labor.—The following statement concerning this order has been made by James L. Wright, of Philadelphia: The



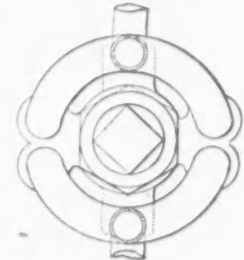
A German Water Meter.—Fig. 3.—Top View of the Meter Piston, shown by Dotted Lines, I and O, Inlet and Outlet Pipes.

ranged below the cylinder, any impurities entering the cylinder with the water are washed out again, while, should the action of the cock be stopped by any accident, no water can pass the meter. One of these meters has been kept at work side by side with a Siemens meter at

organization is secret, and there are many things which I cannot disclose to you. When you ask me if I am a Knight I can tell you that I am, but when you ask me whether such and such a man is a brother Knight, I am not at liberty to inform you if he is. I could not, therefore, tell you the names of the chief men in the organization. One of the reasons for starting the organization lay in the fact that there has always been more need for secrecy regarding names in labor unions than among the Odd Fellows or Free Masons. No argument is required to prove this, for it is well known that the Odd Fellows' or Free Masons' lodge would have no difficulty in getting a job at shoeing a horse or white-washing a fence, while the leader of a labor circle would be deemed worthy of ostracism by many capitalists and employers. Although it is about 15 years since the organization of the society, which took place in this city, yet it did not begin

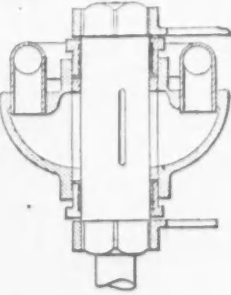


A German Water Meter.—Fig. 4.—Horizontal Section of the Valve.



A German Water Meter.—Fig. 7.—End View of Valve and Pipes.

the Altona Water Works. As we have already mentioned, one of these meters has been at work at the maker's place for upward of three years under a pressure of 130 pounds, and the packing had only to be



A German Water Meter.—Fig. 5.—Vertical Section, showing Valve.

removed once during this time, but the apparatus was also found to work satisfactorily under as low a pressure as 1½ pounds or 3 feet head of water.

to take remarkably long strides toward its present great strength until 1870. Having been founded in Philadelphia, its largest membership has naturally been in Pennsylvania, although it has already ramified a larger number of States. It has between 80,000 and 85,000 members in Pennsylvania. The membership in Ohio and Indiana, too, is conspicuously large. The rather sudden increase of membership about 10 years ago was due, first, to the recognition of the failure of trades unions to accomplish their purpose so long as bricklayers, tailors, masons and all other laborers declined to "pool their issues" and discontinue to hold meetings open to everybody. There was a general feeling of the necessity of getting the various trades to join together in a common cause.

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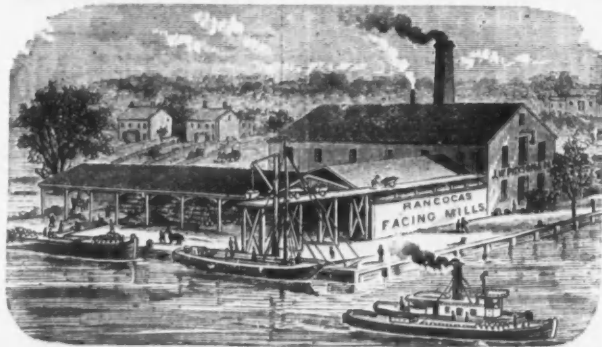
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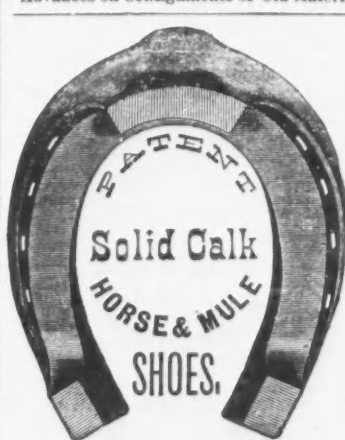
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Pig, Scrap,

NEW AND OLD RAILS,

And Iron Ore.

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Sole Agent for the Sheridan and Leesport Furnaces.

Early History of a Maryland Furnace.

A writer in the Philadelphia Press makes
the following contribution to the early his-
tory of iron making in the United States,
claiming for the Principio Furnace, Md., the
distinction of being the first to produce pig
iron:

Soon after the furnace was built, in 1721,
John Copson, of Philadelphia, took up a
tract of land of 5743 acres here, which after-
ward became the property of the Principio
Company, but the founders of Principio were
Englishmen. They were ironmasters, mer-
chants and capitalists. One of them was
Sir Nicholas Hackett Carew, of Beddington,
in the County of Surrey, Baronet, who was
at the head of a branch of the great house
of Carew, one of England's oldest and most
illustrious families. Stephen Onion and
Thomas Russell, Sr., of Beddington (nearly
all the members of the company seem to
have been relatives and to have come from
one neighborhood in England), were the most
active promoters of the enterprise. The
former was a practical ironmaster. They
came to America, and, after prospecting,
leased and opened ore banks, purchased
wood land for making charcoal, built this
furnace and made arrangements for selling
the iron. Leaving the furnace in charge of
John England, together they returned to
Great Britain in the same ship with Benja-
min Franklin, who, in his memoirs, speaks
of his first voyage to England and of his fel-
low voyagers. He says: "I quitted Phila-
delphia in the ship which anchored at New-
castle. Mr. Andrew Hamilton, a celebrated
lawyer, of Philadelphia, had taken passage
in the same ship, and Messrs. Onion and
Russell, masters of an iron work in Mary-
land, who had engaged the great cabin." Russell
stayed in England, but Onion re-
turned, and in 1726 was again in charge at
Principio. It is probable that the first pig
iron ever exported from America to Eng-
land—a small lot of 3½ tons, in the year
1718—was made at Principio. Prior to the
Revolution, Maryland and Virginia made
and exported more iron than any of the
colonies. In the custom house returns in
England the two colonies are always coupled
together, because the Maryland iron was
first sent to Virginia in small boats to be
reshipped to England, and it is therefore
impossible to allot to each colony its proper
share of iron exported under the fostering
care of the proprietary government. The
production of iron increased in Maryland
until 1751; it, with Virginia, exported to
England 2950 tons of pig iron against 199
tons from Pennsylvania, 33 tons from New
York, 9 tons from New England and 17 tons
from Carolina.

In 1761 the eight furnaces and ten forges
in Maryland made 2500 tons of pig and 600
tons of bar iron, while the annual production
of England herself at that period was only
17,000 tons of pig iron. Some of the ore
banks worked by the Principio Company
were on the Patuxent River, below the site
of the future Baltimore, and were first dis-
covered by that wonderful man, Captain
John Smith, in 1606. In 1730 the country
about Principio was covered by a dense for-
est, and charcoal, consequently, was very
cheap. At that time wood-cutters were paid
2/9 per cord for cutting, colliers received 6/
and 7/ per load for coaling, and the "wood
leave," or price of the wood on the stump,
was reckoned at 1/ a cord. The ledger of
Principio Furnace for the year 1727 shows
the cost of making pig iron then, and to
those familiar with the present cost of
making charcoal iron it will be interesting
to compare the two.

Account of pigs at furnace, August,
1727:

Iron ore, 90 tons, at 15/	£ 8.
Charcoal, 90 loads (11,380 bushels), at 18/	67 10
Oyster shells and limestone, quantity not given	5 0
Wages—John Barker, founder, 40 tons, at 3/6	5 0
Other labor, 40 tons, at 5/6	12 0
Miscellaneous disbursements	2 0
Total	£171 10

Total production, 40 tons pig iron, at
a cost per ton of £4. 5/9, and the iron sold at
the furnace for £10 per ton. Blooms were
valued at £25 and bar iron at an average of
£35 per ton. The forgers received £1 per
ton for making blooms. Slaves were often
employed at the work, and on the books
there is an entry of a payment to "Indian
Jack." The white forgers received 20/
per ton wages, and the slave got a bonus of
1/ for the same work.

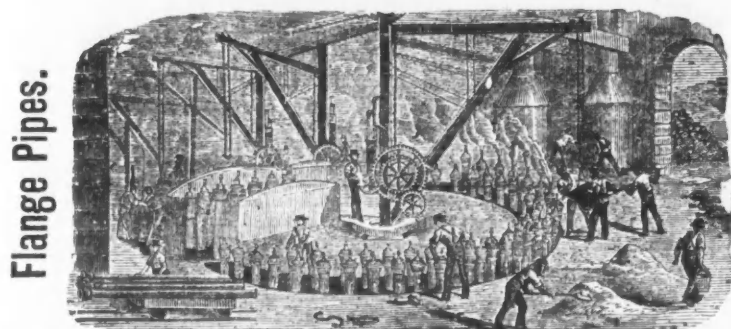
The slaves were fed on corn and pork, and
they seem to have had plenty of those staple
products, in which it is probable Maryland
also surpassed the other colonies. Many En-
glish convicts were shipped to Maryland, and
the colonial mansions were generally built
with convict labor. The convicts were often
employed at the furnace, and Stephen Onion
has recorded that one of them named
Gregory made nine attempts to run away
within 16 months, and finally made an un-
successful attempt to commit suicide.

Augustine and Lawrence, the father and
brother of George Washington, were among
those who had an interest in the Principio
Company, which was retained by the Wash-
ington family until after the close of the
Revolution. It is probable that their con-
nection with the furnace may be traced to
the influence of Samuel Gilpin, the owner of
a mill at Gilpin's rocks, and with whose
families the Washingtons had intermarried
in England. The Principio Company had
soon purchased other furnaces in Mary-
land and Virginia, and John England wrote
from Principio to the company in London:

"5 JANUARY, 1795.
"As to ye dividing ye shares of ye new
founded works in Virginia, have advised
with a counselor about it, who tells me yt if
ye deeds come over for you to signs in Eng-
land, and either of you should dy before or
alter yr minds yt ye don't signs then it sets
Washington at liberty and all ye works is at
an end. * * * If ye see fit to make
Captain Washington a small present of wine,
along with ye Virginia cargo, and to signify
to him yt what I have done with him on yr
behalf you like and approve on, or to that
effect, that I leave to your consideration
either to do it or not."

Lawrence Washington died of consump-
tion in 1752, leaving his interest in the Prin-
cipo Company, which he had inherited from

A. H. McNEAL & BRO., BURLINGTON, N. J.



CAST IRON PIPES FOR WATER AND GAS.

ESTABLISHED IN 1848.

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HAMMERED AND ROLLED

STEEL,

Warranted Equal to any Produced.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws, Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke Stacks, Tanks, &c.

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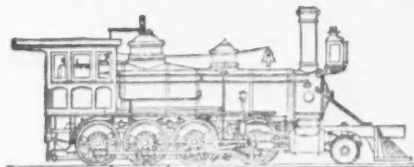
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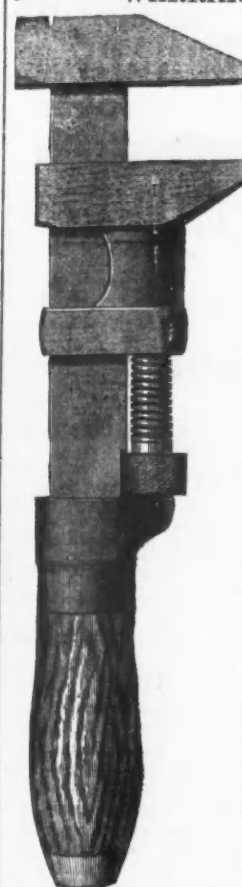
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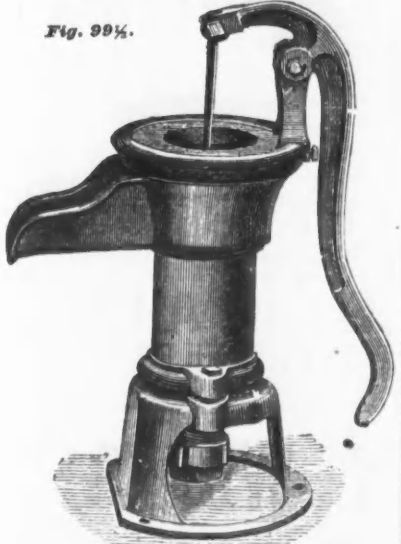
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Cast Fast & Loose,**

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IRON & BRASS PUMPS.

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We beg to call the attention of Architects, Builders,
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one, neat in appearance, easy to put on, and not
liable to get out of order. The springs are made from
wire made expressly for us, and for this particular
purpose, with the view of great elasticity, durability
and power. They produce a continuous pressure
from the point where the door is wide open until it is
closed, and then hold it perfectly in position. It has
a solid pin in connection with short hollow ones,
causing little or no friction, the whole power of the
spring being exerted in swinging the door. It is Fast
Joint, and can be used for either right or left hand,
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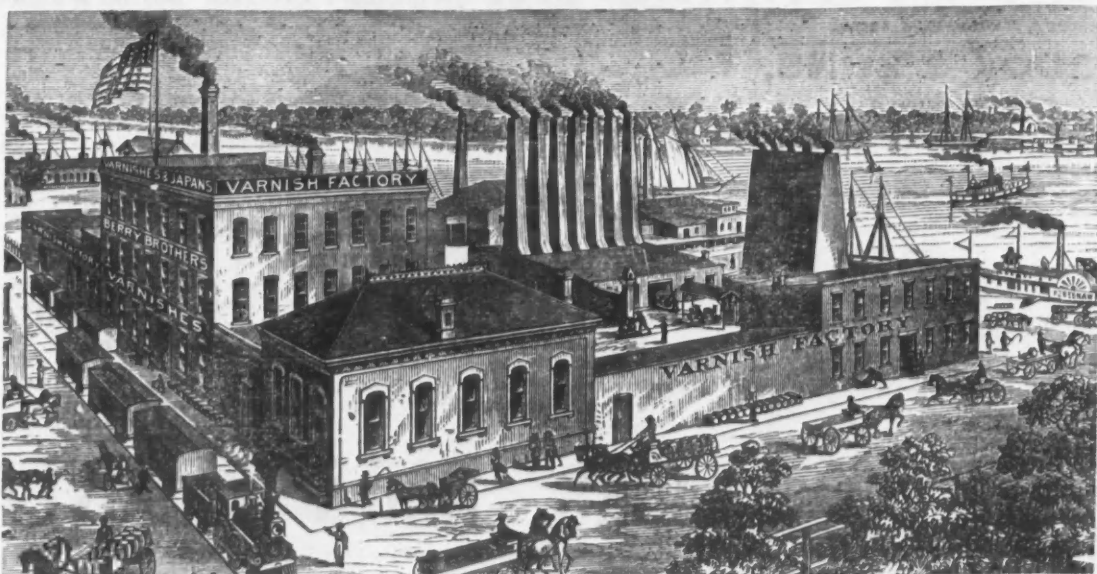
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West Lombard St.; PHILADELPHIA, 57 North Front St.; BOSTON, 141 Milk St.; NEW YORK, 279 Broadway.

his father Augustine, to his daughter, and
after her death, which event soon took place,
to his half brother, George, who afterward
sold it to his brother Augustine. In 1751
the Principio Company were the owners of
four furnaces, two forges, and an immense
number of slaves and live stock. Their
tracts of land in Maryland alone amounted
to 30,000 acres, and one-half of the pig iron
exported from this country to Great Britain
was made at their works. Nathaniel Chap-
man, who was for some time engaged at the
Principio Works, afterward went to Vir-
ginia. His daughter, Lucy, was the third
wife of Samuel Washington, a brother of
George. On the fly-leaf of a copy of Park's
Laws of Maryland, 1727, is written:

His liber pertinet
Deny it who can
Nathaniel Chapman
A very honest man,
In oppido Principio
He is to be found
Si non moritur
If not underground.

Just before the break in the relations be-
tween the colonies and the mother country,
the Principio Company were struggling with
many difficulties. When the timber was cut
for charcoal the streams ran dry; iron ore
had become scarce, and charcoal had to be
hailed a considerable distance. The slaves,
grown old, from workers had become pen-
sioners, and the value of iron had fallen. In
1780 the property was confiscated by Mary-
land and the company came to an end,
though it had really lost all control over its
property when the war began, Washington
and the brothers Russell alone saving their
share.

In 1786 the confiscated property at Prin-
cipio was sold to Colonel Samuel Hughes and
others. They made cannon balls and cannon
for the government. Thirty-two-pound can-
non were made then and were hauled by
horses to Pittsburgh. Hughes lived extrava-
gantly, and would have fallen ultimately in
consequence thereof, even if the war of 1812
had not hastened events. Cockburn's fleet
went cruising up the Chesapeake. His
barges entered Principio Creek and a part
of his command landed below the furnace.
They burst some of the Principio cannon
and spiked the rest, saying that "the Amer-
icans knew better how to make guns than
to use them." Then they burned the boring
mill, furnace, coal house, grist mill and
a bridge over the creek. Hughes was
wrecked financially, and he rode from the
gates of Mount Pleasant on a sorry old gray
hack in 1836, until which time the furnace,
partly restored by Hughes, gradually went
to decay. Pennsylvania again became as-
sociated with Principio. Messrs. Joseph
and George P. Whitaker, Thomas Garrett
and others bought it, and under the man-
agement of George P. Whitaker, it was re-
built and again put into active operation.
At the time of their purchase innumerable
squatters had settled upon the land; it
then became a pasture in common, and the
buildings had either rotted or had been
pulled down. In making excavations on the
shore of the Principio Creek they unearthed
the completely covered walls and ruins of
what is supposed to be the original furnace,
and among them found an entire "pig"
bearing the date 1722. During the long era
of prosperity which old Principio has since
known, George P. Whitaker has been its
chief manager, and for many years he has
been its sole owner.

Manufacture of Tin Plate.

A correspondent in England furnishes the
following interesting particulars concerning
the tin plate trade:
This industry, in all its branches, being of
no slight importance to a large number of
your readers, I propose to furnish a few par-
ticulars of its present state, &c., some of the
details being taken from a work just pub-
lished by Mr. P. W. Flower, of the Neath &
Melyn Works, giving a history of the rise
and progress of the trade. Long before their
manufacture had been commenced in Great
Britain, tin plates had been successfully made
in large quantities at the works of the Duke
of Saxony, in Bohemia. From that country
the secret reached England in or about the
year 1670, and the first works were estab-
lished at Pontypool contemporaneously
therewith. For fifty years, however, the
new process made little or no progress, and
it was not until 1720, in the reign of George
I, that the plates were made on anything
like a commercial scale. Prior to the year
last named all the tin plates used in Great
Britain were invariably imported from Ham-
burg. The Saxons kept the method of man-
ufacture a strict secret, as was mentioned by
the famous Rönar, who wrote on the sub-
ject in 1725. An Englishman named Yar-
ranton penetrated the mystery during the
seventeenth century. The Pontypool Works
were set up by the Hawbury family and
still remain in their possession. The next
works erected were those at Kidwelly in
1720; at Pontlin in 1747, and at Carmarthen
in 1750. Between 1750 and 1800 five other
establishments were reared. The period be-
tween 1800 and 1825 witnessed the erection
of seven more. Between 1825 and 1840 ten
additional works were built, and from 1840
to 1850 eight others. The ten years next fol-
lowing saw the building of six more, and the
succeeding decennial period nineteen new
ones, while from 1870 to 1875, sixteen further
establishments grew up. Thence until now
the increase has been slower; but there have
been two works built and there are now a
couple of others in course of construction.
Of the 75 establishments in operation, 16 are
in Monmouthshire, 14 in Carmarthenshire,
27 in Glamorganshire, 9 in Staffordshire, 3
in Worcestershire, 1 in Herefordshire, 2 in
Flintshire, 1 in Gloucestershire, 1 in Cum-
berland and 1 in Scotland. The total pro-
duction is estimated at about 4,000,000
boxes, or nearly 200,000 tons, per annum,
of which an exceedingly large proportion
goes to the United States. The European
consumption is estimated at about 500,000
boxes, or approaching 30,000 tons, yearly,
the largest buyer being France. The town
of Nantes alone uses up 50,000 boxes an-
nually for canning sardines, &c. To China
and India only about 10,000 boxes are sent
each year. The marks relating to English
and Welsh tin plates are so well known that
I need not particularize them here further
than to remark that each additional X de-
notes an advance of 21 lbs. in weight.

terne plates (terne, French for dull) are
coated with a mixture of tin and lead, and
are made in sheets up to 40 x 25 inches.
The home consumption of tin plates is var-
iously estimated as being from 500,000 to
750,000 boxes per annum. It varies, of
course, with the general state of the prin-
cipal hardware industries. The precise pro-
duction cannot be ascertained, several of
the manufacturers having always steadily
refused information to all inquirers, from
the keeper of the mining records downward.
Mr. Flower, himself in the trade, sets down
the yearly output at 3,000,000 boxes, but
another gentleman of equal status says
he is certain that 4,000,000 boxes is a more
accurate estimate. Besides the English and
Welsh works, there are others on the Con-
tinent and in the United States. I believe
I am correct in stating that in your country
four such establishments exist. I have no
statistics as to their productive capacities.
In France there are a dozen tin plate man-
ufactories. Of that number the eleven prin-
cipal works are these, with the number of
boxes yearly:

Montataire (Oise), making	80,000
Commentry (Allier), making	70,000
Hennebont (Morbihan), making	70,000
Gueugnon (Saône et Loire), making	30,000
Bains (Vosges), making	20,000
La Chaux-de-Fonds (Neuchâtel), making	10,000
Bourg-de-Sèze (Jura), making	10,000
Le Verdier (Saône et Loire), making	10,000
Lemouise (Vosges), making	10,000
Gouille, près Besançon (Doubs), making	6,000
Audincourt (Doubs), making	2,000
Total	340,000

boxes of tin and terne plates per annum. The
owners of these works are, respectively,
Société Anonyme des Forges et Fonderies de
Montataire, Compagnie des Forges de Cha-
tillon et Commentry, Trotter frères et Cie,
Campionnet et Cie, Vve Th. Cavaillé, De
Buyer, Société Anonyme des Hauts-Four-
neux, Fonderies et Forges de Franche-
Comté, Perraudin et Cie, Vor, de Pruyves,
Société Anonyme des Usines de Gouille, and
Cie des Forges d'Audincourt et Dépendances.
There are a great variety of French marks
for the different sizes, sorts and qualities of
tin and terne plates. They are also packed
differently from our own, some being 150,
others 75, 225, 112, 200, &c., sheets in each
box. There are several works of this class
in Bohemia, notable among them being those
of the Duke of Erweinlovst, at Rothau,
who packs 150 or 300 sheets per box. His
marks are FF, F, A, AA, W, F, FFF, FFH,
FH, AH, according to sizes and weights. In
Russia, also, I believe, one or two establish-
ments are in existence, but no details of
them are at present available.

**A Method of Constructing Factory
Floors.**

A curious method of laying floors is used
in France when great solidity is needed, and
which has obtained a wide application. It
consists in putting down a floor, not, as
usual, on sleepers, but in embedding the
boarding in asphalt. Pieces of oak, usually
about 2 1/2 x 4 inches broad and 12 to 30
inches long and 1 inch thick, are pressed
down into a layer of solid asphalt, not quite
half an inch thick, in the well-known her-
ring-bone pattern. To insure a complete
adhesion of the wood to the asphalt and ob-
tain the smallest possible joint, the edges of
the pieces of wood are planed down, bevel-
ing toward the bottom, so that their cross-
section become wedge-like. It is stated that
these floors are used mainly for ground stories,
in barracks and in hospitals, and that they
have been laid in the numerous newly con-
structed forts around Metz. A number of
advantages are cited in connection therewith.
A plan in some respects resembling this has
been employed in the construction of the floors
in a new factory recently erected by Messrs.
Bliss & Williams, Brooklyn. It is similar,
however, only in some of the more general
features, the details being altogether differ-
ent. Sleepers are employed, but instead of
stretching between supports they are solidly
banded in concrete. Upon them planking
is placed, each plank as laid being bedded in
hot tar.
One of the most annoying points of many
otherwise well-built factories is their poorly
constructed floors. A tight, smooth, strong
and durable floor is what is wanted, but in
floors as commonly constructed some of these
qualities, at least, are lacking. A floor on
which heavy machinery can be placed with-
out regard to the position of beams and
girders, is a rarity. Floors which have to
rest upon the ground, as ordinarily built,
are constantly wearing out and are never to
be depended upon. The construction em-
ployed in the factory above mentioned com-
bines all of the desirable qualities which we
have mentioned, and avoids the objection-
able features. The business conducted in
this factory, which is the manufacture of
presses and dies, is such as will test any floor
quite severely. Accordingly, whatever con-
struction is satisfactory in this case is very
likely to prove desirable in other instances.



Construction of Floors in the Factory of
Bliss & Williams, Brooklyn.

The accompanying illustration shows the
construction employed. The surface of the
ground after the top earth had been removed
was thoroughly smoothed and rolled. Four
inches of concrete was then applied, and
while this was soft locust stringers were
bedded in it. These stringers were spaced
about 30 inches between centers. After the
concrete had become perfectly hard and
solid, 2-inch planks of Georgia pine were
laid, each plank in turn being bedded in hot
tar, which was spread on to the concrete as
fast as the planks were laid and spiked.
The result is a floor upon which the heaviest
machines can stand in any convenient pos-
ition without the necessity of any special
foundations. Moreover, it is water-proof,
damp proof, and no miasma can arise from
the ground through it. A floor of this kind
is both cheap and solid, but an advantage
which will appeal to every factory owner

ASPHALTUM and all kinds of BLACK VARNISHES.

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Paris, 1878.



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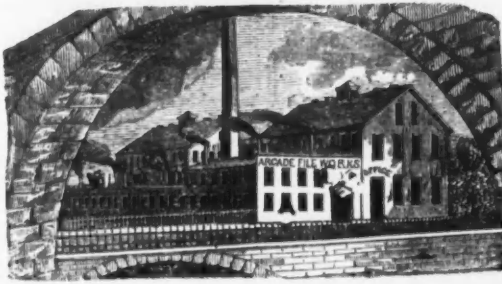


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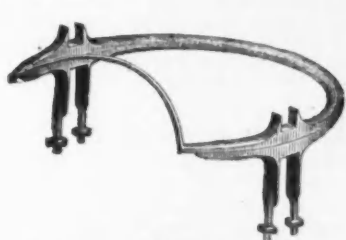
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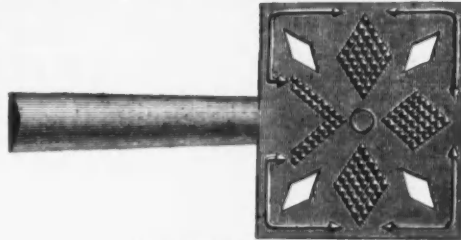
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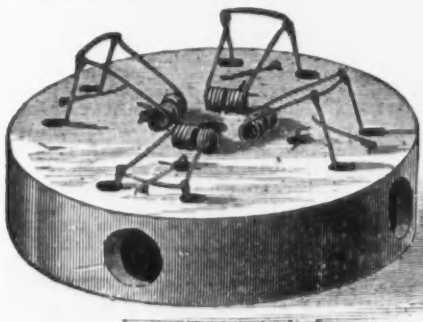
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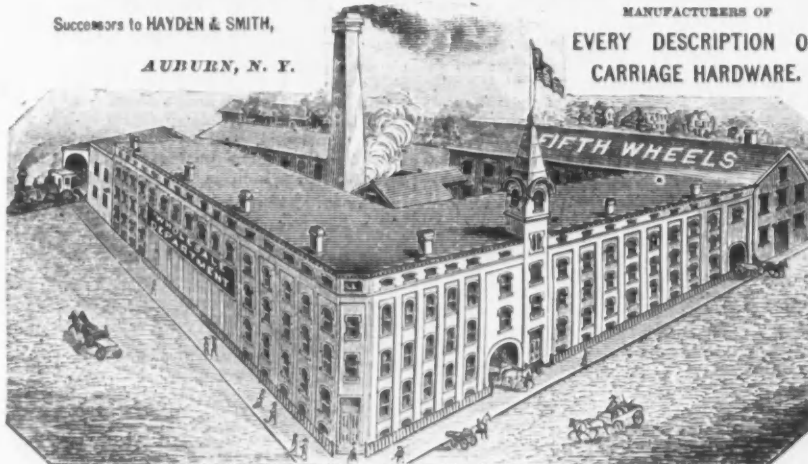
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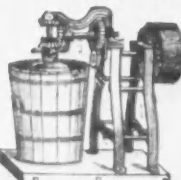
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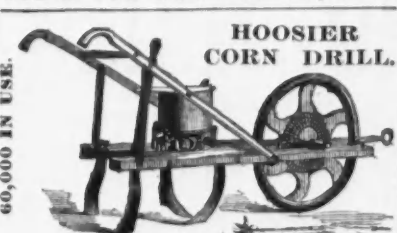
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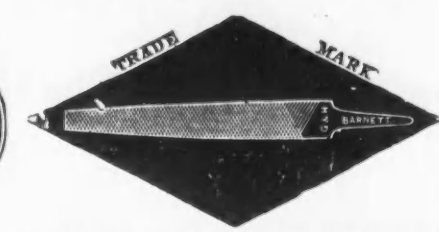
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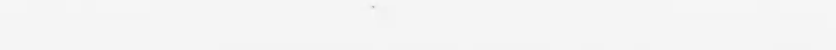
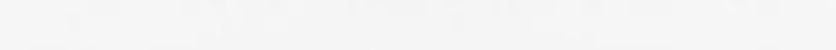
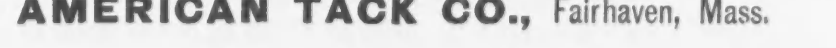
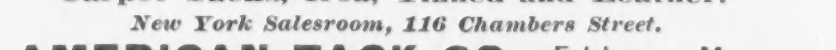
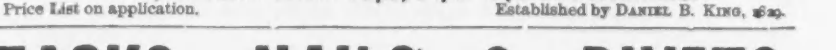
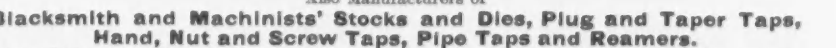
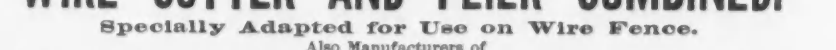
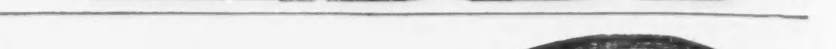
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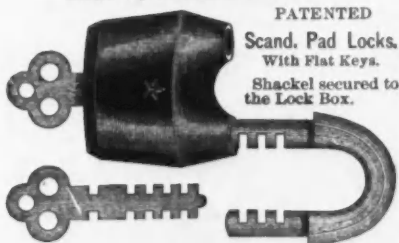
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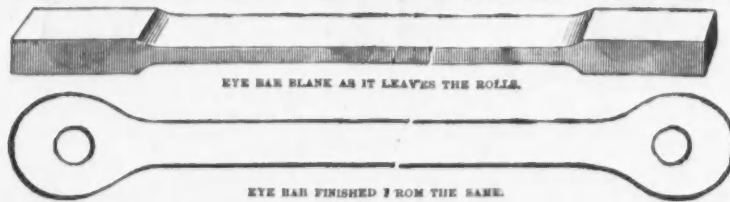
STOVE RESTS are designed to place under the feet of Stoves and Ranges, for the purpose of raising them from the floor or platform. They are about 3/4-inch thick, covered with sheet metal in zinc, brass and nickel plate. Highly polished and finished. Packed one set of 4 pieces in each paper box, and 36 sets in each case. Sizes (inside of circle on top)
2, 2 1/2, 2 3/4, 3 1/2 inch.

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is drawn down to a point from the rod, thus:

It is the only Hot Forged and Hammer Pointed Horse Shoe Nail, made by machinery, in the World.

Some other manufacturers claim to make a hot forged Nail, but you will observe on all such a sheared edge near the point.

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EMPIRE FORGES

IMPROVED without Belts, Bellows, Crank Pins, Dead Centers or Back Motion. Send for Circular.
EMPIRE PORTABLE FORGE CO., COHOES, N. Y.

and builder is that such a floor will last until worn out from the top. There can be no decay from the under side.

It is reported that floors constructed upon this general plan have been in use in some of the older factories upward of 25 years. They have not come into general use, however, and this description, no doubt, will be entirely new to the majority of our readers. We recommend the plan to any of them who have charge of the construction of factories in which heavy machinery is used, believing it will be found of great advantage.

Commercial Law.

Accommodation Indorser.—H. was the accommodation indorser of one G. Notes were discounted by the bank for G. at an usurious rate of interest and renewed from time to time. G. becoming insolvent, H. was notified to pay the note. He proposed to give his notes with an acceptable indorser. This proposition was agreed to. G.'s notes were given up to H., and H.'s own note was taken by the bank. In a suit by the bank against H. upon this note, it was held that the defendant was not entitled to allowance of credit for the usurious interest paid by G. The rule that the vicious element in an usurious contract survives in all its transmigrations, is confined to cases in which the obligor or promisor remains the same. *Macungie Savings Bank vs. Hottenstein, Sup. Ct. Pa.*

Usury.—Christian Mayer, the owner of a property on Sixteenth street, below Market, in Philadelphia, mortgaged it to Charles F. and George G. Lennig, trustees under the will of Frederick Lennig, deceased. This mortgage was recorded May 21, 1875. A second one, recorded June 2, 1875, was given to the Twentieth Ward Building Association. Mayer died soon afterward, and the first recorded mortgage was foreclosed. A writ was served against the dead man and judgment taken for want of an appearance. The property was put up for sale, and bought in by Messrs. Lennig for a sum a little above the amount of their judgment and costs. The sheriff made return that the purchasers being first-lien creditors he had taken their receipt for the amount of their judgment as part payment of the purchase money. To this return exceptions were filed by the second-lien creditor, the building association, who claimed that the first record mortgage had been given for \$280 in excess of the sum actually received; that this \$280 was a bonus over and above the legal rate of interest, and was therefore usurious. This sum was claimed by the building association. An auditor was appointed, who decided against the claim; but exceptions being taken by the building association to the report of the auditor to the Court of Common Pleas No. 1, sustained the exceptions and directed the bonus money to be paid to the building association. An appeal was then taken by the Messrs. Lennig to the Supreme Court. That tribunal, in an elaborate opinion, goes over the whole ground of decisions from the earliest reported cases to the latest, and finally decides in favor of the appealing parties and against the claim of the building association to the \$280. In substance the court says that before the act of May 28, 1855, the taking of usurious interest was unlawful and sometimes considered as fraudulent, and though the act made a radical change in the law, the adjudications made before its passage were not quickly effaced from the judicial mind; but that late decisions have settled that the mere fact that a debtor has paid or agreed to pay in good faith and in the usual course of business more than 6 per cent. interest, is not enough (of itself) to establish a fraud upon creditors, and that it is only where a usurious contract is entered into conclusively as a scheme to hinder and delay creditors, that the latter have any standing to contest a judgment entered upon such usurious contract since the act of 1855. "It is not, therefore, now unlawful for a debtor to pay and a creditor to receive more than 6 per cent." The debtor may refuse to pay the excess, but he is not bound to repudiate it.

Protest of a Draft.—The U. S. Supreme Court has rendered a decision in the case of Merritt Cox and J. C. Whitlock, plaintiff in error, vs. the National Bank of the State of New York; in error to the Circuit Court of the United States for the District of Kentucky. This was a suit brought by the bank against the drawer, acceptor and endorser of a certain draft addressed to "Cox and Cowan, New York, N. Y.," and by them accepted in the following form: "Accepted: Cox and Cowan." Payment of the draft at maturity not being made, the bank, as lawful holder thereof, caused it to be protested and instituted the present suit to recover the amount. The drawer and endorser set up the defense that the draft was not duly presented to the acceptors for payment, and that the protest was irregular and invalid for that reason. The court holds that where no place of payment is expressed in a bill or note, the general rule is that the proper place of presentment is the place where the acceptor or maker resides or does business. In cases, however, like the present, where the drawee of the bill of exchange lives and does business in one town or city, and accepts without explanation or correction a bill addressed to him as if he resided in another city, the bill may be presented in accordance with its address, even although the holders know that the acceptor lives and does business elsewhere. A bill addressed to "Cox and Cowan, New York, N. Y.," and by them accepted without indication of any place of payment, is presentable and payable in New York, and may be duly protested there, even although Cox and Cowan reside and do business in another city or another State. Every step necessary to bind the drawer and endorser in the present case was, therefore, duly taken by the holder of the bill, and he is entitled to recover. The judgment of the lower court is therefore affirmed.

Assignment.—A. made a voluntary assignment in trust for his creditors. B. afterward issued execution on his judgment, by virtue of which the sheriff seized and sold the goods as the property of A. Held that B. was entitled to the money made on his

execution, whether or not the title to the goods was vested in the assignee. *Matter of Kelly's Appeal, Sup. Ct. Pa.*

Bill of Lading.—The delivery of a bill of lading by a common carrier, and its acceptance by the shipper at the time of the delivery of the goods, constitute a contract between the parties embracing the conditions contained in the bill of lading. The shipper who thus accepts a bill of lading cannot complain of or allege ignorance of its terms. The provision in the bill of lading that the company should not be responsible for loss or damage by fire, unless occurring through the negligence or default of the agents of the company, relieved the Pennsylvania Railroad Company from liability for goods destroyed by fire communicated by the mob at Pittsburgh during the riots of July, 1877. *Wertheimer et al. vs. Penn. R. R. Co., U. S. Cir. Ct., S. Dist. N. Y.*

Bond.—A bond was sent for approval to the obligee's agent, who was not to deliver it except upon certain conditions. He did deliver it without fulfilling them. Held that there was no legal delivery, and the bond was therefore void as an obligation and would not support an action. *Weed Sewing Machine Co. vs. Jendervine, Sup. Ct. Michigan.*

Agent as Trustee.—Where the agent of the owner of certain crude oil delivered to a common carrying company for transportation is also the agent of the company, and both delivers the oil to the company and receives the purchase money, he, or any other of the company's officers into whose custody he may deliver the same, with notice, holds the same in trust for the owner, after deducting the company's charges. *Jones vs. Tanner, Sup. Ct. Pa.*

The Locomotive Building Interest.

Respecting the business of the last few months, similar statements are made at the official headquarters of all the locomotive builders represented in New York city. All continue full of orders, although the pressure upon them is not so great as a few months ago. The boom commenced in September or October, and continued with increasing vigor up to about February 1st, when it seemed to culminate. All the manufacturers were overwhelmed, the demands being far beyond their capacity. Orders meanwhile came in from all quarters, notably from the Northwest, partly for re-equipment, but largely for the extension of new lines of traffic. Of late the rapid advance in the prices of iron has operated as a check, a disposition being manifested to hold off for a change in the market. Improvements in some instances have been deferred. In other cases, contemplated enlargements have been reduced or estimates cut down. Notwithstanding, as already observed, the builders have all they can do, with engagements in several instances for months ahead. The Pennsylvania Railroad shops are said at the present moment to have some 90 engines in various stages of construction, and all other leading lines of transportation are constantly adding to their equipment. Among the most recent orders are 30 locomotives for the Texas Pacific Railroad, equally divided between the Darnforth, Schenectady and Pittsburgh locomotive works, besides 12 standard gauge locomotives at the works last mentioned, for the Atlantic and Great Western Railroad. Thirteen new engines are building at the Michigan Central locomotive works, in addition to four powerful engines for fast passenger trains. Then there are seven 35-ton passenger engines under way at the Altoona shops. Car builders, too, have as much as they can do. We learn that the Wagon Car Company, of Springfield, have contracts in process of execution which aggregate no less than \$1,500,000. This affords some idea of the amount of work which must be in progress throughout the country.

As to profits in building, complaints are made that thus far they are not satisfactory, a fact mainly due to the increased cost of materials and labor since the period of greatest activity commenced. At the beginning all were greedy for orders, competition was sharp, and contracts were taken very low. At a later date the iron boom brought new perplexities. The trade therefore is not considered prosperous as regards net profits realized, but prospects are very hopeful.

It is observed, with reference to payments for work ordered, that most of the business done has been for cash, or at least on short credits. Corporations have had at their disposal appropriations from net earnings—in other words, available cash from some source or other. The rolling stock companies which formerly extended facilities for building have very considerably withdrawn from the field.

The Great Eastern.—So much importance has been attached to the Great Eastern in times past, and the career of the great vessel has been so chequered, that the following report of a recent meeting of the Great Eastern Steamship Co., the proprietors of the famous ship, may be of interest: The report presented for the past year showed a balance to the debit of profit and loss an account of £404. The directors further reported that the smaller repairs of the ship had been continuously carried on, and as the arrangements of the Milford Dock Company were sufficiently forward to admit of the necessary repairs to the ship's bottom being effected, the few new iron plates required were now being put in. The directors continued to receive inquiries in reference to the employment of the ship, and negotiations on that subject were now pending, and as freights were in better demand, they trusted that some satisfactory arrangements would shortly be concluded. The chairman, in moving the adoption of the report, said he had nothing to report of a satisfactory character. As the vessel required compound engines, no one would employ her in her present condition. The directors had tried to induce the shareholders to find the money, but they failed in getting it. There would always be a difficulty in getting her employed, as large steamers were now worked at a much less cost than this ship could at present be worked. A discussion took place as to the value of the ship, and the chairman said it was worth £250,000.

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FRIEDMANN & LAUTERJUNG,

Manufacturers of
PEN AND POCKET CUTLERY,
Solid Steel Scissors, Shears, Razors, &c.
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And the celebrated "ELECTRIC SHEARS." Nickel Plated
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Agents for the BENGAL RAZORS.
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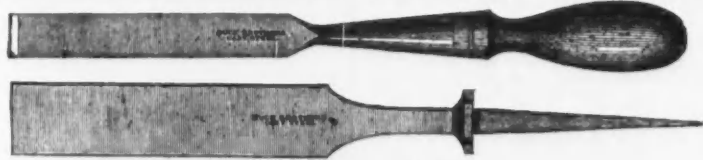
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WHERE SPECIAL ATTENTION GIVEN TO ORDERS FOR EXPORT
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FOUR PEPPERCORNS AND A DIAMOND.
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PLANE IRONS.
Gauges of all lengths and circles beveled inside and outside. Nail Sets, Scratch and Belt Awls,
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Wood Workers'
Clamps,
To open 2, 2½, 3, 4, 5, 6, 7,
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Strongest and Best Clamp Made.
Malleable Ox Shoes
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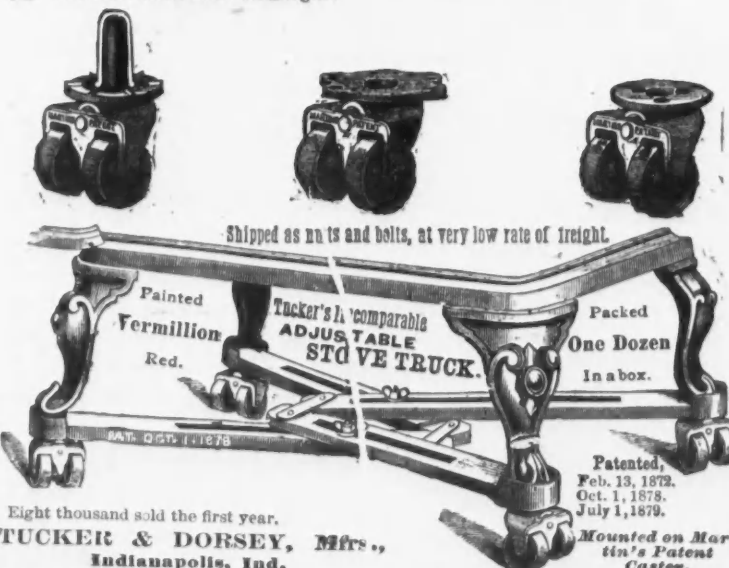
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ALL OTHER GOODS IN PROPORTION.
All our Spoons, Forks, etc., are plated upon
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SCIENTIFIC AND TECHNICAL.

The first truly authoritative scientific statement in regard to

THE PHOTOMETRIC POWER OF THE EDISON LIGHT

has just been given to the public, and as the data submitted embrace some, though not all, important points, they are well calculated to again arouse public attention. Professors Barker, Young, Brackett and Rowland, who were called upon to examine the Edison electric light, have concluded their labors, and have embodied the results in a report which has been published in the *American Journal of Science*. It is reported in the daily press that Prof. Barker has, in the course of a lecture on the subject before the Franklin Institute, taken a very strong position in favor of Edison's success. Until a more reliable and authoritative summary of his remarks reach us we must content ourselves with presenting to the readers of *The Iron Age* the following abstract of the work performed by the scientists referred to, at Mr. Edison's shops at Menlo Park, N. J. Owing to the absence of proper and accurate instruments, Prof. Barker and his associates adopted the following method for testing the efficiency of the light. It consisted in putting the lamp under water and observing the total amount of heat generated in the water per minute. For this purpose a calorimeter, holding about one and a quarter kilograms of water, was made out of very thin copper; the lamp was held firmly in the center, so that a stirrer could work around it. The temperature was noted on a delicate Baudin thermometer graduated to 0.1 C.

As the experiment was only meant to give a rough idea of the efficiency within 2 or 3 per cent., no correction was made for radiation; but the error was avoided as much as possible by having the mean temperature of the calorimeter as near that of the air as possible, and the rise of temperature small. The error would then be much less than one per cent. A small portion of the light escaped through the apertures in the cover, but the amount of energy must have been very minute. In order to obtain the amount of light and eliminate all changes of the engine and machine, two lamps of nearly equal power were generally used, one being in the calorimeter while the other was being measured. They were then reversed and the mean of the results taken. The apparatus for measuring the light was one of the ordinary Bunsen instruments used for determining gas lights, with a single candle at 10 inches distance. The candles used were the ordinary standards, burning 120 grains per hour. They were weighed before and after each experiment, but as the amount did not vary more than one per cent. from 120 grains per hour, no correction was made.

As the strips of carbonized paper were flat, very much more light was given out in a direction perpendicular to the surface than in the plane of the edge. Two observations were taken of the photometric power—one in a direction perpendicular to the paper and the other in the direction of the edge, and we are required to obtain the average light from these. If L is the photometric power perpendicular to the paper and l that of the edge, then the average a will evidently be very nearly:

$$a = \frac{1}{2} L + \frac{1}{2} l$$

In the paper lamps it was found that $l = \frac{1}{2} L$ nearly; hence $a = \frac{3}{4} L$ nearly. The lamps used were as follows:

Number.	Kind of carbon.	Size of carbon.	Approximate resistance when cold.—Ohms.
580	Paper.	Large.	147
581	Paper.	Small.	147
582	Paper.	Small.	154
583	Manilla fiber.	Large.	87

The capacity of the calorimeter was obtained by adding together the capacity of the water, the copper of the calorimeter, and the glass of the lamp and thermometer. The calorimeter and cover weighed 0.103 kil., and the lamps about 0.035 kil.

The results are combined in the following table. The number of candles per indicated horse-power were calculated by taking 70 per cent. of the calculated value, thus allowing about 30 per cent. for the friction of the engine and the loss of energy in the magneto-electric machine, heating of wires, &c. As Mr. Edison's machine is undoubtedly the most efficient now made, it is believed that this estimate will be found practically correct. The experiment on No. 817 was made by observing the photometric power before and after the calorimeter experiment, as two equal lamps could not be found. As the fiber was round, it gave a nearly equal light in all directions, as was found by experiment:

Lamps used in.	Photometric power.	Capacity of calorimeter in units of temperature in degrees, F.	Energy per minute in foot-pounds.	Mean No. of candles per horse-power of electricity.	Mean No. of gas jets of 16 can. each pr h. p. elec.	Mean No. of gas jets per indic. horse-pow.
201	580	17.5	13.1	2.57	1.75	3486
580	201	13.5	10.1	2.82	1.62	2540
581	201	18.5	13.2	2.71	1.44	1511
201	581	44.6	33.5	2.76	2.29	4898
850	809	19.0	14.3	2.81	1.14	2483
809	850	12.2	9.2	2.79	1.54	3330
819	819	17.2	12.7	1.28	2708	209.6

The increased efficiency, with rise of temperature, Prof. Barker concludes, is clearly shown by the table, and there is no reason, provided the carbons can be made to stand, why the number of candles per horse-power might not be greatly increased, seeing that the amount which can be obtained from the arc is from 1000 to 1500 candles per horse-power. Provided the lamp can be made either cheap enough or durable enough, there is no reasonable doubt of the practical success of the light, but this point will evi-

dently require much further experiment before the light can be pronounced practicable. That Mr. Edison will finally overcome the difficulty, however, no one who knows him can doubt.

Dr. C. William Siemens recently gave, before the Royal Society, in London, an account of some very valuable experiments, extended through about two months, with a view of determining

THE INFLUENCE OF ELECTRIC LIGHT ON VEGETATION.

The experiments were made at Sherwood with mustard, carrot, bean, cucumber, melon, and other plants which grow rapidly. These, which were planted in pots, he arranged in four classes or groups. One class was kept always in the dark, another in the light of day as long as possible, a third always in the electric light, and the fourth was exposed to daylight and electric light in succession. It was found that the plants would not live long when kept in the dark, but that they would thrive about as well in the electric light as the daylight. But those did best of all which were constantly exposed to both daylight and electric light in succession. While these experiments were not extended over a period long enough to allow of final results being reached, they clearly point to some important conclusion. They show that plants do not require any rest during the 24 hours; that their growth may be materially quickened by giving them the benefit of electric light at night; that electric light will produce chlorophyll in the leaves of plants and promote their growth, and that injurious effects upon plants are not caused, to any material extent, by the small amount of carbonic acid and nitrogenous compounds generated in the electric arc.

Dr. Siemens further expresses the opinion that the effects of night frost may be counteracted, and the ripening of fruit promoted, by means of the radiation of heat from powerful electric arcs. He states that a light equal to 1400 candles, at a distance of 6 to 7 feet from the growing plants, appeared to be equal in effect to average daylight in England at this season of the year. Dr. Siemens gave his audience a beautiful illustration of one of his experiments by putting some budding tulips in a strong electric light, which in about 40 minutes caused the buds to open out in full bloom.

From the accounts that reach us from England, it appears that the eager search for some method of producing

ARTIFICIAL DIAMONDS

is quite likely to lead to important scientific results at least, while there seems to be little prospect of making the precious gem on a large scale in paying quantities. While it may be of interest to state that the efforts of Mr. Hannay appear to have been crowned with success, it is to the methods employed by him in producing his minute splinters of diamond, as detailed before the Royal Society, that we wish to direct attention. Mr. J. B. Hannay and Mr. J. Hogarth commenced a series of experiments with the view of throwing further light upon what Dr. Andrews called the "critical state" of matter. He had observed that under high pressure and at elevated temperature some gases passed a state which it was a difficult matter to refer either to the gaseous or the liquid form. Messrs. Hannay and Hogarth have succeeded in furnishing further proof of the continuity of the liquid and the gaseous states. They found, with the aid of an apparatus specially constructed for the purpose, that some gases possessed the power of dissolving solids above the critical point, and that the solid thus dissolved might be deposited if the pressure was suddenly decreased. Many researches of purely scientific bearing were made, until it occurred to Mr. Hannay that a solvent might possibly be found for carbon, and as the gaseous solutions nearly always yielded crystalline solids on withdrawing the solvent or lowering its solvent power, it did not seem improbable that carbon might be obtained in the crystalline or diamond state. A number of experiments were accordingly made with charcoal, lampblack, graphite, but instead of solution, only a chemical action was induced. A curious reaction was, however, noticed, which seemed likely to tend to further discovery by furnishing carbon in the nascent state, and consequently easily soluble. When a gas containing hydrogen and carbon is heated under pressure in presence of certain metals, its hydrogen is attracted by the metal, and its carbon left free. Now, Mr. Hannay found that when the carbon is set free by this action of the hydrogen in the presence of a stable compound containing nitrogen, the whole being nearly at red heat and under enormous pressure, the carbon is so acted upon that it can be obtained in the clear transparent form of the diamond. The "stable compound containing nitrogen" is, however, for the present his secret. The greatest difficulty he has found is the construction of an apparatus strong enough to resist the enormous pressure, combined with a high temperature, for while the 1-inch hydraulic tubing sufficed for the earlier experiments, and withstood a pressure ranging up to 850 atmospheres, tubes constructed on the gun-barrel principle, having a bore of half an inch, and an external diameter of 4 inches, were torn open in nine cases out of ten by the pressure found necessary to crystallize carbon. According to Mr. Hannay, the carbon he obtained is as hard as natural diamond, a statement corroborated by the evidence of Mr. Maskelyne, and is also in crystals, with curved faces belonging to the octahedral form. These burn readily on thin platinum foil over a blow-pipe, and leave no residue, and after two days' immersion in hydro-fluoric acid, they show no sign of dissolving, even when boiled. On heating a splinter in the electric arc it turned black—a very characteristic reaction of diamond. Lastly, a little apparatus was constructed for effecting a combustion of the crystals and determining their composition. The ordinary organic analysis method was used, but the diamond crystals were laid on a thin piece of platinum-foil, and this was ignited by an electric current, and the combustion conducted in pure oxygen. The result obtained was that the sample (14 milligrammes) contained 97.85 per cent. of carbon, a very close approximation, considering the small quantity employed.

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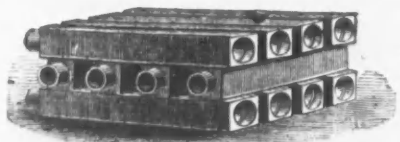
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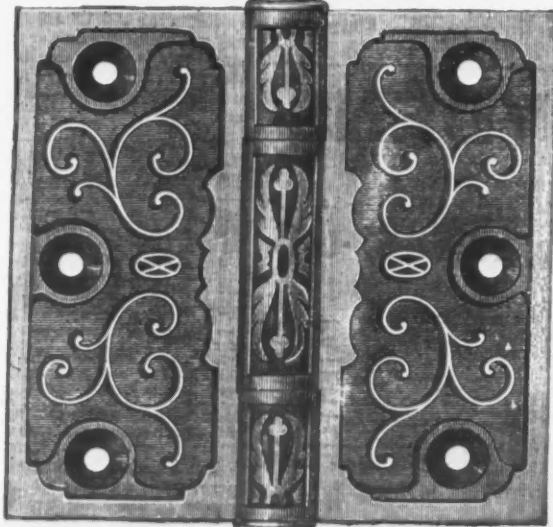


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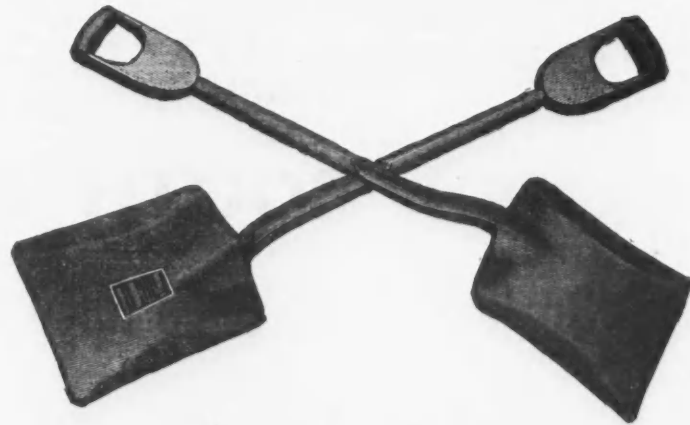


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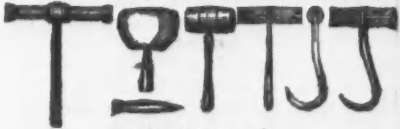
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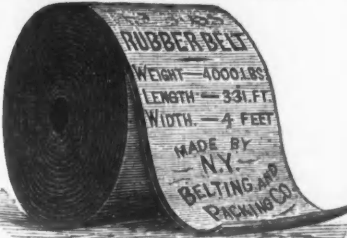
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Pat. Jan. 26, 1869.

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SCALES.

Cuts of a few goods made by

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Creasey's Ice Breaker.

The accompanying cut represents a machine for breaking ice, patented by E. J. Creasey and manufactured by J. S. L. Wharton, corner of Fifteenth and Wood streets, Philadelphia.

The larger sizes of this machine are capable of taking 50 to 100 pound cakes, and are intended for ice cream manufacturers, fish and meat packers, hotels and boarding houses. The smaller sizes are adapted for saloons, dispensers of soda water, summer beverages, &c. The advantages claimed for this machine are that it is simple and strong, and not liable to get out of order; that it cuts the ice evenly, and can be adjusted by a screw at the back, so as to make the pieces any size desired; that it picks the ice, not crushing or breaking it, and thus causes no waste; and that it is easily operated, a boy being able to break by hand 150 pounds per minute.

Contract Labor in the New York State Prisons.

In compliance with a resolution of the Assembly, adopted in May last, Superintendent Pillsbury has sent in a report on the subject of contract labor in the State Prisons. It is accompanied by communications from Carrol J. Wright, Chief of Massachusetts Bureau of Statistics of Labor; the Hon. Erastus Brooks, Prof. Francis Wayland, of Yale College; Edward Atkinson, of Boston; William H. Chapin, Secretary of the Rhode Island Board of State Charities and Correction; J. B. Parmenter, John S. Perry, M. G. Leonard, the late E. C. Wines, D. D., and others.

After quoting the conclusions arrived at by the commissions appointed by the States of

loosening the screw and thereby separating the plates, this being done with very little delay or inconvenience. Each file will, it is said, last three years, outwearing 30 dozen ordinary files.

LABOR AND WAGES.

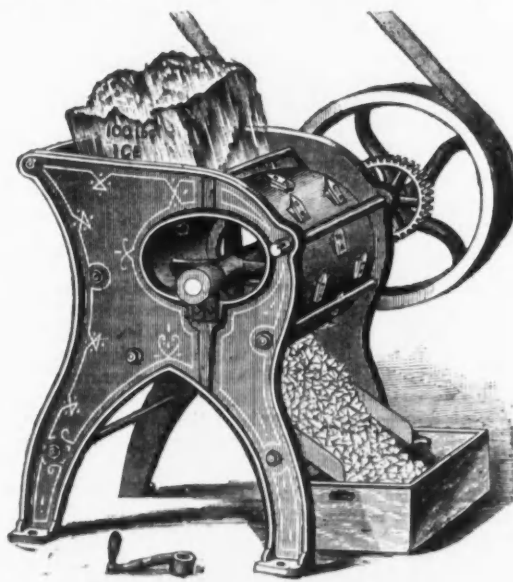
The strike at the National Tube Works Rolling Mill at McKeesport, Pa., has ended, the firm having signed the scale for boiling as was demanded, and the men have resumed work.

The strike at Leetonia, Ohio, over the employment of a roller who was objectionable to the union, has ended in the discharge of the roller. The strike lasted two weeks. A correspondent in a Pittsburgh paper who signs himself "A Union Man," in speaking of the strike at the works of Moorhead & Co., states that one of the fundamental rules of the Amalgamated Association is that no roller can teach green hands unless the apprentice is a son or brother.

The office men and the proprietors of Kimberly, Carnes & Co.'s furnace, at Sharon, were busily engaged on the 25th ult. in running the furnace, in which they succeeded admirably. This was caused by the recent strike.

We notice elsewhere the strike against the Amalgamated Union by the workmen at Moorhead & Co.'s sheet mill at Pittsburgh. On Saturday afternoon a meeting of the rolling mill men of the district was held and the action of Vice-President McAninch in advertising for men to take the strikers' places was endorsed. The men were exhorted to go back to work, and Mr. McAninch was requested to secure for them their old positions.

According to latest advices, the puddlers of Pottstown have compromised on \$5.50 per



CREASEY'S ICE BREAKER.

Massachusetts, Connecticut and New Jersey to investigate the same subject, Superintendent Pillsbury says he is of the opinion that every capable prisoner should be required to work at labor which, for moral and economical reasons, should be productive, because labor enforced as a punishment merely, is degrading in its effect on the prisoner and unjust to society and the State.

The cost of maintaining the prisons of this State for the last fiscal year was \$20,374.15; in 1876 the cost was \$605,040.53, and while this result is not solely due to the contract labor system, it would have been unattainable under any other system. Contract convict labor, he argues, does not materially affect the interests of free labor, the productions of such labor being insignificant as compared with the total production of the country. There are now, in all the prisons of the country, 23,524 convicts who compete at skilled labor with 666,622 free workmen in the same branches of labor in the same States, and with 1,269,240 in the whole United States, these figures of the free-labor force being taken from the census of 1870.

On January 31, 1880, there were employed under contract in New York State Prisons, 2440 prisoners, of whom there were making shoes, 594; stoves 911; horse collars and harness, 122; hats, 312; hollow-ware, 177; axles, 207, and laundry work, 117. In 1870 the number of persons in this State, outside of prisons, engaged in the same branches of industry was 280,637. In reply to the allegation that prison competition has resulted injuriously, by concentrating labor on a very few branches of industry, Mr. Pillsbury says it would destroy the large industries to diversify the trades carried on in prisons, so as to distribute the effect of prison competition among a greater number of trades, and that although there appear to be only eight trades carried on in our prisons, in one of them, the stove manufacture, 19 distinct trades are included in that one head. Concerning the complaints made when the contract system in prisons was adopted, he says they are becoming fewer and fewer, as the business prosperity of the country has advanced in the last two years, and are now almost unheard. Nor does he believe that prison contractors derive any material advantage from their products as against their outside competitors, inasmuch as their products are ordinarily of poorer quality and sell for less in the market. He closes by saying that unless the contract system is abolished in Massachusetts, New Jersey and Connecticut prisons, it would be of little, if any, advantage to abolish it in this State.

A File of Novel Construction.—At a recent meeting of the Royal Scottish Society of Arts, Mr. J. Kirkwood, of Edinburgh, described a new file for soft metals and wood. This tool is formed of about 200 separate pieces of steel, connected by an iron bar, which is passed through and bound together by a screw. The advantage claimed for the file is that filings of soft metal or wood can be got rid of by simply

ton and gone to work. All the other places—Birdsboro', Harrisburg, West Fairview and Duncannon—are still out for \$6.

Scales seem the order of the day at Pittsburgh. There are already in the iron mills in that city scales in force for boiling, scrap-iron, bushing, muck rolling, shingling, slabbing, bar rolling and heating, nail plate rolling and heating, knobbling, sheet rolling, plate and tank rolling, and guide mill rolling. It is proposed to add to these, as the following notice will show: "The roughers, catchers, pair heaters, matchers and doublers on the sheet mills; roughers, catchers and doublers on bar and nail plate mills; also the hands around the muck rolls in the first district, are hereby notified to meet at Emerald Hall, Sixth avenue, this city, on (this) Saturday, March 27th, at 3 o'clock, sharp. The object of the meeting is to arrange scales for the different branches, and it is imperative that each branch come with several scales, and prepared to do business."

The strike at Norristown, Pa., among the puddlers, ended in the defeat of the men, and work has been resumed at the old price.

The puddlers employed by the Glasgow Iron Company, who three weeks ago demanded an increase of wages to \$6 per ton, have compromised with the company and will continue work at \$5.50 per ton. Their wages had previously been increased four times in five months and without their asking for it.

The grinders' strike at the Beaver Falls Cutlery Works has failed, the places of the strikers being supplied with new men at the old price.

The tinsmiths of Troy, N. Y., have formed a union which already has 75 members. They will demand an advance in pay.

The Fitchburg (Mass.) Steam and Engine Company are running their works day and night and are in need of more good machinists, as they have 27 unfilled orders for engines from 200-horse-power down.

Beginning with March 1, the puddlers of the Cumberland (Md.) Rolling Mill have been receiving \$4 per ton.

The Valentine Rolling Mill, of Williamsport, Pa., is paying \$5 per ton for puddling.

The miners in the anthracite coal fields begin work steadily next month. One very encouraging association with the revival in this industry is the increase made in the miners' wages, those in the Schuylkill region receiving full pay after April 1 for the first time in six years. Those in the Scranton region have been notified of an advance of 10 per cent. It has not been much over a year since these people had as much as 20 per cent. taken off their pay.

Princeton College is to have a new telescope, costing \$25,000. The money to purchase the instrument has been subscribed by the friends of the college, Robert Bonner heading the list with a subscription for \$10,000.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, April 1, 1880.

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CONTENTS.

First Page.—The Bethlehem Furnace. Railway Extension in Austria. The Belgian Exhibition. Metallurgical Notes. The New Western Steamer. The Iron Age.
Third Page.—A German Water Meter. Knights of Labor.
Fifth Page.—Early History of a Maryland Furnace.
Seventh Page.—Early History of a Maryland Furnace (Continued). Manufacture of Tin Plate. A Method of Constructing Factory Floors.
Ninth Page.—Commercial Law. The Locomotive Building Interest. The Great Eastern.
Eleventh Page.—Scientific and Technical.
Thirteenth Page.—Cressey's Ice Breaker. Contract Labor in the New York State Prisons. A File of Novel Construction. Labor and Wages.
Fifteenth Page.—English Iron in the American Market. Investments in Gold and Silver Mines. The Design and the Materials of the Tay Bridge.
Seventeenth Page.—The Billings Oil Stove Patent.
Nineteenth Page.—New Publications. Our Imports of Iron and Steel. Industrial Items.
Twenty-first Page.—Trade Report. General Hardware.
Twenty-second Page.—British Iron Market. Iron, Metals Old Metals, Paper Stock, &c. Exports. Imports. Coal. Philadelphia.
Twenty-third Page.—Philadelphia (Continued). Pittsburgh. Chattanooga. Boston. New Orleans. Louisville. Cincinnati. St. Louis. Richmond. Baltimore. Our English Letter.
Twenty-fourth Page.—Our English Letter (Continued). Foreign. The Nickel-Plate License Question. Direct Trade with Spain.
Twenty-fifth Page.—Mining and Mineral Items.—The First Water Works at Pittsburgh.
Twenty-sixth Page.—The Iron Age Directory.
Twenty-seventh Page.—New York Wholesale Prices.
Twenty-eighth Page.—New York Wholesale Prices (Continued).
Twenty-ninth Page.—New York Wholesale Prices (Continued).
Thirtieth Page.—Philadelphia and Pittsburgh Hardware and Metal Prices.
Forty-first Page.—Boston Hardware and Metal Prices.

A pretty little internal fight is in progress in the Amalgamated Iron Workers' Association at Pittsburgh. It seems that the number of pairs to a turn's work on the sheet mill had been increased. The pair heaters, roughers, catchers and matchers objected to the increase and refused to work. The Executive Committee of the First District Amalgamated Association of Iron and Steel Workers was called in, and after inquiry into the situation ordered the strikers to resume work, which they refused to do, and on this refusal the committee has decided that any union man has a right to go to work in place of the strikers, and the vice-president of the association has advertised and recommended members of the association who want work to apply to the sheet rollers at the works. The strikers retort that the committee and vice-president have

overstepped their authority, and so the matter stands. This strike brings up some nice questions which are not new in this country, though they have rarely been pressed to a solution, and it will be interesting to see how they will be settled, and especially to know if any union man or non-union man will take the place of the men on strike; also, if they do so, whether they will not be treated as black sheep even by those who have notified them that the place was open to any one who would take it. We have in mind a somewhat similar case in the North of England. The result was that the men held their places and the union was beaten; and we believe it will be so in this case. The union may authorize its members to take the place of the strikers, but those so doing will be regarded as "black sheep," all the petty annoyances that are so effective will be brought to bear on them, and in the end the old men will have their places again. This is only an opinion, but it is based on a good deal of knowledge of how these contests work. We believe that the union are acting in good faith in the matter, but that the feeling will be too strong for the officers.

English Iron in the American Market.

A correspondent, whose letter on the subject of "English Iron in American Markets" we print on another page, takes a rather more cheerful view of the competition of foreign with domestic iron than seems to us fully warranted by the facts. Perhaps our Western friends look at this subject from a different standpoint from that which Eastern manufacturers, who feel the competition more strongly, are able to occupy. Our correspondent's arguments to show that there is really no danger of an importation of foreign manufactured iron large enough to seriously disturb the market here, sounds very much like the assurance which the lawyer gave his client in jail, that he could not be arrested and imprisoned on such a charge, notwithstanding the fact that he had been arrested and was then in prison. It may be that the obstacles to a large importation of English rolled iron are serious, and even insurmountable, but the fact remains that there is enough of that iron now here to demoralize the market, and that holders are offering it at prices lower than those at which our mills can afford to take orders. What concerns us most is to know whether these importations, in excess of the requirements of the market, are to continue, or whether the demand from other countries is likely to revive to such an extent as to give firmness to English prices and draw off some of the surplus which is likely to be unloaded here. It seemed to us that the January Board of Trade returns gave warrant for the hope that other countries would come to our rescue, and that before long the English markets would stiffen to an extent which would make further consignments to our already weak market unprofitable and undesirable. The February returns, we are sorry to say, do not strengthen this hope. During that month the exports of British manufactures showed a very considerable increase over February, 1879, amounting to about 31 per cent.; but as compared with January, 1880, the iron and steel exports show a decline. Looking at the items of the February returns in detail, we find a remarkable comparative increase in pig iron, of which the United States were the largest buyers, although much heavier shipments went to Belgium, offset, however, by smaller Dutch purchases. Bars, angles, bolts and rods increased by 130 per cent., the growth being mostly with the United States, but also, in a less degree, with British North America, India, Australia and the smaller countries. In railroad iron and steel of all sorts the augmentation was about 25 per cent., chiefly with us, aided by the larger consignments to Egypt, South Africa and Australia. Hoops, sheets and plates show an increase amounting to about 90 per cent., the bulk of which came here and the remainder to India, Australia and the unclassified countries. Of tin plates, the principal buyer was, as usual, the United States, but the increase in the aggregate only reached about 9 per cent. Cast or wrought fell off about 7 per cent., the larger wants of Brazil and the minor countries being counterbalanced by the smaller requirements of India and Australia. Old iron for remanufacture again reveals a great comparative increase over the corresponding period of last year, the gain in exportations to the United States being about 200 per cent. One of the most notable features of the returns is that dealing with unwrought steel, of which about 400 per cent. more was shipped, mostly to the United States. Under the important head of hardware and cutlery there was a considerable expansion of business, amounting to about 8 per cent., the chief gains being with Brazil, France, the United States, South Africa and India, while Australia fell off considerably. Steam engines showed an improvement of about 60 per cent., mostly with Russia, Germany, Spain, Italy, Brazil, India and the minor countries. Other descriptions of machinery and millwork increased about 9 per cent., owing to the better shipments to Russia, Belgium, Italy, Egypt and the United States, although several other important countries were smaller buyers. The special return as to rails does not reveal that enormous demand which some persons, a short time ago, would have had us believe to be likely. Iron rail

exports, it is true, increased over 300 per cent., but the month's total was only 8841 tons, and steel rails advanced but about 16 per cent. on an aggregate of 21,486 tons. Of both sorts the principal buyer was the United States. As a matter of fact, the chief interest of the statistics centers in the quantities set down to the United States, which, as consumers of British iron and manufactures, are already showing signs of surfeit. There was a falling off in February as compared with January in the exports to this country of hardware, cutlery, bars, railroad iron of all sorts, hoops, sheets and plates, tin plates, &c., while the gain shown is confined to pig iron, old iron and machinery. The returns as a whole show that, while the British exports of iron and steel and their manufactures have largely increased as compared with last year, they are not holding their own from month to month, and that on the continuance of a large American demand depends the maintenance of what firmness now exists.

It may be that another month will change the outlook in some respects; at present it is far from encouraging. From our standpoint we see nothing to restrain continued large consignments, except such a decline in prices here as shall render further shipments unprofitable. We cannot close our eyes to the fact that at present the Eastern markets, and to some extent those of the whole country, are controlled by foreign competition. It may be that the quantity of foreign iron here has been greatly overestimated; but it is unfortunately true that the amount is in excess of any present requirements of consumption, and that the prices at which it is offered are forcing a decline in the prices of domestic iron, in spite of all other conditions favoring firmness. Two years ago a good many of our ironmasters were disposed to believe that they had reached a point where they could afford to be quite indifferent to the tariff. It had done a good work, but the iron trade, they said, had reached a position when it made but little difference to anybody whether iron was protected or not. It would be interesting to know how these gentlemen now feel on this subject. We imagine they are somewhat less confident than they were with regard to the ability of this country to hold its markets closed to the world by cheap and abundant production. The lesson is one which should not soon be forgotten. Protection is just as necessary now as it ever was.

Investments in Gold and Silver Mines.

Important and, it appears to us, beneficial changes, at least to the country at large, have been brought about during the last year in the condition of one of the great industries of this country. We refer to the development and systematic working of the mineral resources of the Western States, and notably those of the Rocky Mountains. The most striking and significant of these changes is the transfer of mining headquarters from the Pacific Coast to this city, and, in a measure, to other large seaboard cities. The causes which have led to this revolution are numerous and complex, and it is well worth a closer examination to determine, as far as practicable, whether their effect is likely to be permanent, and whether and how far the result is calculated to benefit the public, the mining industry, the metal markets and certain trades directly or indirectly interested. In former years, the headquarters and the financial center of the mining industry of the Western States was naturally San Francisco. California and Nevada were then, to an overwhelming extent, the chief producers of the precious metals, which alone repaid active search and the investment of capital, while the base metals were looked upon rather as a source of additional expense in working than as affording the means of increasing the revenue or enlarging the profits. The completion of the transcontinental railways tapped the wealth of the Rocky Mountains through new channels, and Utah, Colorado, and other territories loomed up as producers not only of the precious metals, but also of lead. Into this domain chiefly Eastern and European capital found its way, and although some of the most prominent mines were flagrantly mismanaged and audacious swindlers perpetrated, capitalists in greater number and of larger resources turned to the new and promising field. The mining magnates of the Pacific Coast were quick to perceive the direction which affairs were taking, and they made every effort to foster speculation or purchases of San Francisco stocks in this market, probably with a view to repeating the tactics which, after costly experience, had become patent to the majority of small and large gamblers in the old home of mining financiering. Their success, we are inclined to believe, was a very moderate one indeed, and it is to be sincerely hoped, for the sake of the public and of the mining interests in general, that they will never be able to create a repetition of the wild mining stock speculations which have, in California, ruined so many for the benefit of a few. The great discoveries in the Consolidated Virginia and California mines and the Black Hills stampede did much toward attracting attention, but neither occurred at a time which was a favorable one to enlist the sympathy of cautious Eastern capitalists. When, however, owing to a series of good crops and favorable markets, large sums of money flowed to this country for which remunerative em-

ployment was sought, it was only natural that much was directed into a channel which offered not only fair, but really brilliant inducements. Enthusiastic and overdrawn though the reports from Leadville and other Colorado camps might have at first appeared, they were fully borne out by the accounts of those best competent to judge. For these new regions New York became the center of operations, the rival of San Francisco. The final step toward transferring the supremacy to the former was hastened by the course of events on the Pacific. Capitalists, discouraged and oppressed by the passage of hostile laws and the threatening attitude of men like Kearney and his followers, left the Golden Gate to come to the shores of the Hudson.

The importance of this movement has been duly appreciated, and active means are being taken to promote the best interests of the mining industry and the public. The daily press has applied itself with vigor and some discretion to the task of informing the public, and the opinion is fast gaining ground that, while naturally mining has in it elements of uncertainty peculiarly its own, the extraction of the precious metals is not only a legitimate business, but one in which prudent men can conscientiously invest their capital. It is beginning to be understood that, instead of being a wild, hazardous search for hidden enormous wealth, a mining venture, if entered upon and conducted on sound business principles, holds out fair promise of very good returns. Still, there is every reason to fear that while many sincere but sanguine men are now endeavoring to induce moneyed men in the East to associate themselves with them in developing good mines, the revival has brought among us a large class of those unprincipled adventurers whose aim it is to dupe the public by foisting upon it worthless or unproven mineral property. Miners and prospectors are, as the rule (perhaps fortunately so), a sanguine class, and they generally engage the attention and win the support of the more sanguine of the community. While, therefore, investment in mining requires calm judgment and extreme caution, it is but too frequently the case that those who engage in it are apt to have their expectations wrought to the highest pitch. Disappointment surely follows, and the result is that mining is condemned indiscriminately and unjustly, to the great detriment of important interests. The conditions affecting the prosperity of a mining enterprise are so complex and so numerous that none should attempt to arrive at final conclusions in regard to its merits unaided. The title of those holding it should be carefully examined, the property should have the strong indorsement of an expert of high standing, and the financial management must be in the hands of persons of integrity and business ability. The working of the mine itself must be entrusted to the care of trained and experienced men. The development of a mineral deposit and the extraction of ore are not matters which can be left with prudence to a younger son or a trusted clerk, backed, possibly, by a so-called "practical miner."

As at present conducted, many mining enterprises are unsafe and unworthy of the assistance of cautious investors, but as they are generally defective in some of the points touched in the above, their true value will become apparent upon close inquiry. There is a growing disposition on the part of holders of mining property and those putting it upon the market to dispose of it entirely. In the majority of cases we would incline to look upon such a course as indicating, on the part of the vendors, a lack of faith in the value of their mine, which we would consider a sufficient warning to would-be investors. Another indication, to our mind, of weakness is the creation of an enormous and fictitious share capital. We are well aware of the fact that many of our best mines are organized in this way, and that the practice of overcapitalization has become prevalent. Nothing would tend more to repress this growing evil than a refusal, on the part of the public, to risk money in enterprises organized on this basis. Sweeping though this may appear, the public can only be guarded against loss, and our mining industry against severe shocks, by the rejection of any and all stocks which are brought forward with any devices calculated to mislead the uninitiated or to create false impressions. When such mining investments as the Little Pittsburgh, of Leadville, are mismanaged in the interest of speculation, popular faith is severely shaken, and a few repetitions will surely drive out of the market the very men with whose help the resources of our country would assuredly be developed with astonishing rapidity. Few mines have come before the public under such favorable auspices. Dr. Raymond, an able and conscientious mining engineer and geologist, reported that in the ground developed, comprising about one-third of the whole property, there was in sight two millions of dollars' worth of ore, while the probable value of other portions of the property was one million. The mine was placed upon the market at the rate of \$5,000,000 for the whole, the nominal capital being \$20,000,000. In little more than a year it paid its owners in dividends \$1,450,000, when suddenly—and probably to the majority of the shareholders unexpectedly—it was announced that the mine was near exhaustion, and the stock fell until it has now reached a point at which the property is rated at \$2,000,000. Whatever its future may be, there can be no doubt that the

course of the management in New York and Leadville must be condemned as reckless in the extreme. It is understood that the superintendent of the mine had orders to take out of the mine monthly enough of ore to pay a dividend of \$100,000, and that no portion of the proceeds was reserved to open out other portions of the property. It has been shamefully robbed, or "gouged," as the blunt miners put it, without any reference to the future, and there is some suspicion that this course was pursued for stock jobbing purposes. The fact that the mine has still some prospects for the future does not in any way justify its technical managers or its directors. We need hardly do more than point to this striking example as an illustration of the necessity of embarking in such enterprises only after the most thorough and searching investigation, and we may be permitted to add that our remarks are not addressed to that class who buy mining stocks on speculation. No amount of warning can keep them from their gambling practices. Their ultimate failure is almost a foregone conclusion.

The Design and the Materials of the Tay Bridge.

We have had occasion repeatedly to refer to the Tay Bridge disaster, and have endeavored to place before our readers from time to time the facts elicited in regard to the circumstances attending the fall of a portion of that structure, the main features of the design and the aspect of the wreck, so far as brought to light, notably by the engineering press of England. The recent inquiry, conducted by prominent men constituting a committee of the Board of Trade, has thrown a flood of light upon certain points which have very considerably aggravated the situation. We are not inclined to draw sweeping conclusions, reflecting in general upon the skill of English engineers, the honesty of English contractors and the quality of English materials; but it would be idle to deny that public faith has been very seriously shaken, and that the evidence in the case of the Tay Bridge is highly damaging, to say the least. It will be a very difficult matter to convince non-professional men that minor structures are safe when a bridge like that across the Tay, which was regarded as a triumph of English engineering skill, failed, owing to a multiplicity of the most serious defects. All the energies of the government and the profession must be bent upon re-establishing the confidence which has thus been forfeited, and the first step toward the attainment of that end must be a strict and uncompromising search for the truth.

We may, for convenience, arrange the evidence so far collected into three classes—that relating to the outward causes of the failure, to the design and construction of the structure, and to its use as a bridge. While the exact effect of each cause is not probably to be determined, and a close approximation of its relative bearing upon the ultimate result is a matter to be worked out by the Board of Inquiry, the evidence now at hand permits and calls for comment. So far as the circumstances attending the fall of the bridge are concerned, little or nothing of importance has to be added to the facts already well established. The storm during which it was overturned was not by any means of such exceptional violence as to account for the disaster, and though such a gale is not of annual occurrence, it constitutes a danger to which a bridge built to last for many generations might be expected to be exposed repeatedly. All the evidence now at hand clearly points to the fact that the bridge fell because it was excessively weak; and the earlier theories of the derailment of the train and kindred explanations have been long since abandoned. We have had occasion to describe and illustrate the leading features of the design, and to show, in the light of the evidence furnished by the wreck, what parts constituted the principal elements of weakness. These have again been referred to in very strong terms by Mr. J. St. Vincent Day, who states that it would be difficult to conceive a more erroneous distribution of the load than that upon the columns of the bridge, the two outer raking columns having to do twice the work of carrying the girder of each of the four inner ones.

Quite recently, additional facts have come to light which appear to have created in the minds of some the impression that injustice had been done to Sir Thomas Bouch. Of course, it will be a somewhat difficult matter to properly distribute the blame for the disaster; but we do not think the designer ought to be exonerated because the faults of others made the bridge unsafe even than it otherwise would have been. Blunders in the original plan of the Tay Bridge must not be overlooked or pardoned because those who put it up were either dishonest or incompetent, or both. The structure was poorly designed and wretchedly built, and, from present developments, it is more a matter of surprise that it did not fall long ago, than that it should have ultimately tumbled into the river. Formidable though the array of evidence against the designer of the bridge is, the facts reported in regard to the methods used during its construction are truly startling. Who are the deceivers and who the deceived is of little consequence to the public. The latter are solely interested in the facts, which we believe are abundantly substantiated, that the iron used for casting the columns was bad, that the work turned out of the foundry was fre-

quently defective in many respects, and that at least the foremen of the foundry connected at practices intended to deceive either the contractor or the railway company in regard to the soundness of the material which went into the bridge.

To a certain extent, the testimony in regard to the pig iron used for making the bridge columns is of direct interest to American consumers of pig iron, because it contains a warning against the indiscriminate use of the Middlesborough pig employed at the Wormit foundry on the banks of the Tay. Although, as we understand, the bulk of the pig coming to us from the North of England is used for forge purposes, quantities of foundry pig enter our markets also. In general, it is well understood in Scotland and in Germany, where Cleveland pig is used, that while it recommends itself on account of its low price, its properties are such as to bar it from exclusive use, and founders are generally careful to mix it with better grades of metal in order to neutralize its numerous defective points. We cannot enforce the necessity of caution in regard to this metal in a stronger manner than to give a summary of the evidence of the molders employed at the Wormit foundry; and it should be distinctly understood that, though their evidence was rebutted on several other important points, on this point little exception was taken by the foremen or engineers examined. They all complain of the metal as having been sluggish when melted, of being full of impurities, and of cooling suddenly and forming numerous scabs and blowholes. Such was the metal used, and it appears that efforts made, upon their own responsibility, by foremen connected with the works to improve it by adding superior scrap, were promptly put down. One of the engineers in charge testified that, in his judgment, the only means of ascertaining whether the columns were of even thickness was to tap them with a hammer, and he appeared to be happily ignorant of the use of other methods. The molders, it seems, openly filled all blowholes they found with cement, and as they were paid by the day, it is difficult to escape the conclusion that they had orders to do so. They trimmed the scabs, and made it a uniform practice to burn on any lugs which might have been broken off during handling or did not come out in the molds. The columns themselves were cast horizontally instead of vertically, and there is a strong suspicion that some of them were put into the bridge, although they were cracked; and it was even stated that some were afterward simply secured by being hooped. Thus it will be seen that the weakest members of the bridge were rendered still more incapable of outlasting any severe strains by being put up in the most shameful manner. The lugs, upon the soundness of which depended the value of the diagonal bracing, a portion highly important to the safety of the bridge, were patched on; the rods were not well fitted into them, the columns were in some cases not properly connected at the flanges, the metal itself was bad and the columns were unevenly and poorly cast, and finally, they were so improperly doctored down to the foundation masonry, that when the bridge did turn over some of these weak columns were actually rooted up, so that they were not even taxed up to their capacity to resist lateral strain, whatever capacity that may have been.

It is not our intention or our province to inquire whether ignorance, capidity or carelessness led to the Tay Bridge disaster; that is a matter which the proper authorities will, we hope, examine closely and punish to the full extent of the law. We have presented the above for the purpose of clearly showing that the disaster was the result of numerous causes. It is not likely that there is in any part of the civilized world a structure so poorly designed and so wretchedly constructed, and there is little occasion to fear that the severe lesson taught by its fall will or need be repeated.

We may add, in conclusion, that if the account of reliable witnesses be accepted, the drivers of the trains passing over the bridge were frequently in the habit of running at excessive speeds, from 35 to 40 miles an hour. These were actually timed by men of high local standing, who, after unsuccessful remonstrance, preferred rather to pass over the Tay by the more tedious ferry, than risk their lives to the care of reckless railway employees.

The Smoke Nuisance in Cincinnati.

The ladies of Cincinnati are evidently determined that if the smoke nuisance, from which they have so long and patiently suffered, is not abated, it shall be through no fault of theirs. Some time ago we printed an appeal from them to the Common Council, asking that ordinances be passed requiring that, at the water works and other public places where coal is burned, there should be used some effective device for suppressing smoke. Now we have from these indefatigable exponents of women's rights in cleanliness and pure air, a memorial to the city Board of Public Works, which will be read with interest:

CINCINNATI, March 9, 1880.

To the Board of Public Works of Cincinnati: The Association of Ladies to Promote the Cleanliness of the City would respectfully represent:

That during the year past they have been investigating the possibility of freeing the city from the smoke nuisance which so greatly interferes with the comfort and attractiveness of the town as a place of residence, and imposes a heavy tax on all business by reason of the injury it occasions to all

stocks of goods and to the current cost of caring for both business places and dwellings.

They have several times presented the matter to your predecessors, the City Commissioners, and have urged that the duty of the City Government is to make use of such devices for the prevention of smoke as have proved useful, so that the proper stimulants may be applied to private enterprise and a good example set in the way to attract most attention and imitation.

They now beg to call the attention of your honorable board to the fact that devices for smoke prevention have been exhibited at successive expositions in Cincinnati, and have been favorably reported upon by the juries and committees of experts. These have shown that economy of fuel, increase of generation of steam, and cleanliness are all consistent in practice, and it only needs the spread of information on the subject to insure a reform beneficial in a business point of view, and of the most desirable kind when the beauty and attractiveness of the city are considered.

Several examples of such smoke-preventing devices are in successful operation in the city.

One by Mr. Baum has been for several years in operation at the chemical works of Gordon & Co., near Mohawk bridge.

One by Mr. Walker, modified by Mr. Price, is in operation at Price's Mill elevator.

One by Mr. Morgan is in operation at the Children's Home, near the City Buildings.

One by Mr. Sinton is in operation at the Sinton Block, on Vine street near Third street.

Still others might be mentioned which have had a greater or less success.

It is not the part of this association to advocate particular devices, but only to call attention to the fact that several are so successful, and so little expensive additions to common boilers and furnaces, as to remove reasonable excuse for the continued sootiness of the city.

Several of these plans are said to involve a cost of only from \$20 to \$50 in applying them to an ordinary boiler used in manufacturing establishments, or in the heating of public buildings, the running of hotel elevators, &c.

Mr. Sinton, a well-known citizen, who has given personal study to the subject and has invented a device referred to above, authorizes us formally to say to your board that he will give the use of his invention for the public buildings, court house, water works, &c., of the city, free of royalty, and that the expense of applying it is as small as any we have named. He asks us in like manner to request that you appoint a committee to examine his device and its success, having now had it in constant working use for five months.

We therefore respectfully petition your honorable board to appoint a committee to examine the several successful methods in operation for smoke consumption or prevention, and that you will cause one or more of the best to be applied to the Front street and other pumping engines of the City Water Works, and to other buildings within your control; that such official account may be kept and published of the performances of the devices used as may most fully and publicly make known their usefulness, and stimulate a general movement to rid the city of the greatest drawback upon its comfort and cleanliness, and upon the economy of doing business and residing here.

We beg to call special attention to the fact that the very small cost of some of the undeniably successful methods of securing the desired result removes all rational objection to full and satisfactory experiment, from which the whole community will reap the benefit.

By direction of the Ladies' Association,
ELIZABETH K. WHITMAN, President.
SARAH C. PERRY, Secretary.

We fully sympathize with the ladies of Cincinnati in what they suffer from an all-pervading, insidious, inevitable curse of dirt. We suppose people can get used to anything, but people who love to be clean can never be entirely happy under conditions which make uncleanness a necessity. When dirt floats in the air, drifts in clouds with every breeze, and sweeps into the house through every door and window and crack, it becomes something more than a nuisance, and its abatement is demanded by every consideration of health and comfort.

We are not disposed to feel unlimited confidence in the judgment of the members of the Ladies' Association of Cincinnati with regard to the economic value of the several smoke-consuming devices named, and the others vaguely indicated as having "had a greater or less success." We have no personal knowledge concerning them, and, for all we know to the contrary, they may accomplish all that their inventors and the Ladies' Association claim. The suggestion that the Board of Public Works appoint a committee to examine the several devices for burning coal without smoke which may be candidates for public favor, is good. It is also right and proper to demand that when something which answers the purpose shall have been found, the city shall apply it, and thus set the example of reform in a direction which will do much to make the city more desirable as a place of residence. Having done this and determined that one or more means of burning coal for steam purposes is possible without making smoke, the city authorities should go further, and, by ordinance, require that all citizens using steam shall burn coal without making more smoke than is experimentally determined to be necessary, leaving to them the choice of means to be adopted. More difficulty is likely to be experienced with the foundries and iron works of the city; but if the nuisance of a smoke-laden atmosphere is only in part corrected, the gain will be conspicuous.

Certain of our English contemporaries have deemed it fit to express doubts as to the large output of some American blast furnaces. In a recent issue we gave full details in regard to the exceptional make of the Edgar Thomson "A" furnace, and have to record to day a wonderful run made by the Lucy No. 1, which, during the week ending March 21st, turned out 845 gross tons (2240 lbs.) and 1720 lbs. of pig metal, an average of more than 120 tons per day. Until now 100,141 gross tons have been made upon the present lining, and the yield, as above shown, continues to exceed anything yet reached.

The British ironclad Thunderer has been ordered to Spezia to enable her officers to follow the inquiry into the cause of the recent bursting of a 100-ton Armstrong gun on board the Italian ironclad Duilio.

English Iron in American Markets.

PITTSBURGH, March 27, 1880.

To the Editor of The Iron Age.—DEAR SIR: The disturbing element of the greatest power in the American merchant iron market to-day is the condition of the English market and the continued large importation of English iron. The reports of the English market are watched as they probably never were before, and the course of our own market is determined as it has not been for years by the condition of the tone of foreign advances. The chances of importation are discussed and discounted in every change in price, and the question of maintaining the prices already reached are believed to depend largely upon the result of the next English quarter-day. Our English friends themselves evidently expect large exportations of merchant iron, and are basing their prices and advances on what they believe will be the demand from the United States for their iron. Their hope in this respect is hinted at in the letter of your English correspondent of last week. He says:

"Among sound business men there is some speculation as to the probable effects of the release here upon your market. Recent market reports and prices in The Iron Age would seem to show that, even at the dates of those reports, there existed a rather wide margin in favor of the imported iron, so that the drop here ought to give the importers a still better chance. This would, of course, scarcely hold good were any large break to take place in your own prices; but in the other event the result would be curious, and, there is no doubt, anxiously watched from this side."

It is to many a moot point whether the quietude on your side has been the active cause of the reaction here, or vice versa. The probabilities seem to run in favor of the American demand influencing us rather than the contrary, but the tone of our late advices from New York, Philadelphia, &c., is, nevertheless, such as to reveal the fact that our progress or retrogression is a matter of the utmost moment to ourselves. In short, the premises have become so "mixed" that safe inferences cannot be drawn, and we must await further developments before we know "where we are" with precision and accuracy."

While I have no doubt that the condition of the English market should have an influence on our markets, especially at a time when the margin between the prices of the two countries is so great as to admit of importations, I am also of the opinion that the influence of the English market on ours has been very much overrated, and that our fears have given it a weight to which it is not legitimately entitled.

Having made such a statement, it will be expected that I shall give my reasons. In the first place, I believe that the importation of English merchant iron has been very much overrated. A great deal of hoop iron has, no doubt, been imported, and will come in at least so long as the grace allowed by Secretary Sherman lasts. The evidence of this is in the idle hoop mills all over the country. Considerable sheet iron is also being imported, but the amount of other forms of merchant iron has been very much overrated. One reason of this overestimate comes from the same sale being repeated over and over again, or from the same lot of iron being sold and resold, and the aggregate of these sales is reported, rather than the real amount. It is also a fact that considerable of the iron that has been sent here has been on sale. Consignments of English iron have been made to a number of houses, both East and West. Such ventures as these are far from indicating a good demand for English iron, and show that it is not much sought after.

There are several considerations that will interfere with any large importations of English iron. In the first place, the time that will be required to fill an order after it is placed. In the present state of the market, few buyers will care to take the risk of ordering iron that they may not get for three months' time, and it is understood that the makers of the best brands would not undertake to fill orders short of this time. Ordering from abroad, owing to the time required to fill orders and the risks connected therewith, would necessitate the carrying of larger stocks, and consequently more capital.

Again, the quality of a great deal of this iron is unknown, and even when it is satisfactory, blacksmiths and others must learn how to use it to the best advantage—a thing that they do not care to do unless there is a good prospect that its use will be for some time. When the quality is not satisfactory, of course it is not wanted at all. If reports are to be believed, a good deal of the English iron sent to this country is of this character, and a good deal more so close on the border land that it will take a heavy cut in prices to lead to its use.

A third reason that will interfere with large importations, is the fact that a large proportion of the iron used in this country is in shapes and cut to length. Almost all of the iron for wagons and agricultural implements is of this character. The rolls for making this shape iron are not in England, and the trade, in view of its contingencies, would hardly pay for their preparation.

In these remarks I do not desire to underestimate the strength of English competition, nor to imply that there is nothing in it; but I believe that too much has been made of it, and that, while considerable iron has been and will be brought into this country, it cannot be in such quantities as to cause any great alarm.

Respectfully,
MERCANT BAR.

The Dangers of the Panama Canal.—Mr. Robertson, of Louisiana, has discovered the true aim of M. de Lesseps and his fellow-schemers, and has invoked the aid of Congress against their infamous designs by introducing the following resolution:

Whereas, The warm stream of the Atlantic before entering the Gulf of Mexico strikes against the eastern coast of the Isthmus of Panama and would continue to the Pacific but for the existence of that narrow barrier; and

Whereas, After leaving the Gulf it flows across the Atlantic past the coast of Great Britain, creating the temperate climate of that country, which otherwise would have the cold climate of Labrador; and

Whereas, It is an admitted scientific fact that a tide-level canal of sufficient width across Panama

would change the course of the Gulf Stream, and thereby freeze out an English-speaking nation; and

Whereas, The United States would thereby lose its chief foreign market, which loss would not be counterbalanced by the new markets opened by an interoceanic canal; therefore

Resolved, That we emphatically reaffirm the Monroe Doctrine, and that we will bring it to bear against the inhuman designs of France in thus attempting to destroy her chief European rival, and injure the commerce of the United States.

We now expect to see all Englishmen converted to the Monroe doctrine.

Congress and the Tariff.—Small Arms for the Army, Navy and Militia.

(From our Special Correspondent.)

WASHINGTON, D. C., March 31, 1880.

Representative Tucker, chairman of the sub-committee having charge of the letter of Secretary Sherman to the Speaker of the House, respecting the proposed return from ad valorem to specific duty on hoop iron cut to lengths, says that the general business of the Committee on Ways and Means demands so much of his attention, that he has been unable to give this subject any further consideration than to bring together the material, with the view to the preparation of a bill which will meet the approval of the committee. He states that it is doubtful whether a bill can be reported on this subject during the present session, as the business before the committee and House has already assumed such proportions that it will be impossible to reach concurrent action. A few days ago the sub-committee addressed a letter to the Secretary of the Treasury, requesting him to indicate any suggestions that the department might have bearing on the subject of legislation fixing the duty on hoop iron cut to lengths, in order that the action of the committee might not come in conflict with any existing regulations of the department in the details of the proposed bill. The Secretary has made no reply to this letter, and has instructed the officers of his department that they will make no suggestions whatever on this subject, as the views of the department were set forth at length in the letter of the Secretary to the Speaker of the House. To-morrow orders will be issued to the customs officers of the United States to collect duty on hoop iron cut to lengths at the specific rate.

This action on the part of the department has left the sub-committee in somewhat of a fog, as whatever may be their desire to change the duty on hoop iron cut to lengths, so as to keep within the 35 per cent. ad valorem, there is an evident hesitation to report a special bill for fear that it may open the way to embarrass the duties on other manufactures of iron, which would be brought under the same principle involved between the manufacturers and importers, the first claiming that hoop iron cut to lengths is nothing more than hoop iron, and the last that it is a manufacture of hoop iron.

A letter has been received at the Treasury Department from New York, appealing from the decision upon which a duty of 45 per cent. is laid upon flat Bessemer steel with single and double ribs about half an inch wide, to be made into barbed iron fences. The importers claim that, instead of the collector collecting a duty of 45 per cent., this class of Bessemer steel should be scheduled the same as wire rods or as steel in forms not otherwise provided for, and thus pay 35 instead of 45 per cent. The subject is now under advisement, and will be reported upon by the proper officers of the department without delay. It is evident, from the numerous inquiries received at the Treasury Department, that the parties interested in cotton ties are anxiously awaiting the action of the sub-committee of the Ways and Means Committee on the cut-hoop question, in order to ascertain what effect the recommendations may have upon their own interests.

A bill has been introduced into the House of Representatives which, if it becomes a law, will very sensibly stimulate the arms manufacturing interest of the United States. It provides for a board, to consist of the Secretary of War, the General of the Army, two Senators and three Representatives, to examine all the latest patterns of small arms, and to select that best suited for adoption as the standard and regulation arm for the army and navy of the United States, and for the use of the militia of the several States and Territories. The arm selected is required to fire at least 100 shots per minute without reloading, and must not cost more than \$18.50 each, and any single breech-loader selected, firing easily not less than 15 loads a minute, not over \$15. When the selection of arms shall have been made, the Secretary of War is authorized to have manufactured, under the supervision of the General of the Army, 250,000 at the Rock Island (Ills.) Arsenal, and, in addition to these, not to exceed 1,500,000 stand of arms, by not less than three manufacturers of arms. One-half of these arms, under the bill, are to be distributed proportionately among the organized militia of the States and Territories. The manufacture of 1,000,000 in trenching tools is also provided for, and the whole, small arms and trenching tools, are required to be constructed and delivered in equal quantities each year within four years.

The quietest put upon the attempt of Townsend, of Illinois, to surreptitiously bring about action favorable to a revision of the tariff, has practically put an end to any serious prospects of change in the tariff during the present session. The Committee on Ways and Means have renewed their consideration of different articles for placing on the free list, or for a modification of the tariff, but there is no prospect of concurrent legislation at this session at least. The committee are now preparing a bill upon which a large number of articles have been named for free list or less duty. The tariff men of the committee are making little opposition, but are waiting to have the bill so loaded down that it will be an easy matter to table it.

Petroleum has been discovered in large quantities in the vicinity of Lake Ainsley, Cape Breton.

An Industrial Art School in New York.

A few months ago the idea occurred to some of our citizens to found a free industrial art school, which would utilize the valuable collection of antique models in that department of art belonging to the Metropolitan Museum of Fine Arts. The museum contains the famous Cesnola collection of Cypriote pottery, that of Chinese and Japanese pottery made by Mr. Avery, and a quantity of statuary and paintings; and it was felt that it would be wise to employ this wealth of illustration and instruction in creative and decorative art for more practical purposes than the mere entertainment of visitors. The trustees of the museum put this idea in force by starting a fund, to which others have subscribed, for the foundation of the school before mentioned. Rooms were obtained on the third story of 31 Union Square, two instructors of ability were engaged, and invitations were extended, by newspaper advertisement and circular, for pupils desirous to avail themselves of the advantages of instruction here freely offered. It was to apprentices—mainly those connected with working in wood and metals—that the projected school was expected to principally commend itself. Thus far, the sanguine hopes of the originators of the scheme have not been fully realized; but the prospect is, nevertheless, encouraging. Those offering themselves as pupils were much less advanced than it was desirable they should be. They had not yet learned the rudiments of drawing generally, and their instruction had to be undertaken from the very beginning. Not more than one-sixth of the school were clever young men, who had already had sufficient knowledge of drawing to enable them to start where it was desired that all should. Then, again, among the pupils seeking instruction in artistic working in metals, those who offered themselves were prospective artisans in gold and silver. No workers in iron, brass or bronze came forward, and it is feared that they will be slow in availing themselves of this tuition, since the designs for the principal metal employed here, iron, are customarily furnished by architects or taken from European models, so that our iron workers feel little or no need of cultivating their own taste or originality. With the advancement in popular taste which must necessarily be among the results of the successful maintenance of a school like this, an improvement in this direction may, however, be confidently expected.

The school was divided into two classes of 24 pupils in each, one for instruction in woodwork, under the direction of Mr. A. Sandier, meeting on Tuesday and Friday evenings; the other of metal workers, under Mr. C. B. Atwood's tuition, assembling on Monday and Thursday evenings. It was only required of pupils that they should furnish their own drawing materials. All else—models, rooms, light and competent instruction—was furnished gratuitously by the school. Beginning with teaching them drawing, where they do not already possess some knowledge of that necessary art, they are next instructed in the principles of artistic composition, the principles of design as applied to their various pursuits. They are taught what simple lines are graceful, why certain combinations of those lines are beautiful, why slight deviations from those lines produce less happy results, what decorative effects may be heightened by contrast, what by harmony of color and what by mere arrangement of the simplest lines and hands of tint; why certain forms, available and beautiful when applied to wood-working, are out of place in metal or other materials, and vice versa. Form is the primary consideration; next comes decoration. When the student has learned to appreciate the beautiful, and to understand in what its beauty consists, in the exquisite models put before him, he will then be called upon first to change and modify to various sizes and uses those models; next to originate and perfect ideas of his own. The utmost encouragement will be given to him in this direction, and he will, instead of being held to mere imitation of the work of others, be shown how to elaborate his own thought so as to make the most of it, how to eliminate its errors, how far it may be carried and to what application it is best adapted. All this is necessarily a work of time. For perhaps the first year of its existence the work of the school will be elementary. Then, when it begins to create, it will be appreciated by the public and established on a solid foundation. There is surely no reason, the managers say, why such an institution should not flourish here as well as the one in connection with the South Kensington Museum in London, or the several schools of this character maintained in France. After the summer vacation, a more convenient and easily accessible location, it is hoped, will be found, and then, too, it is expected that the number of pupils will be increased and the general average of the ability of beginners will be higher as the value of its tuition becomes known. Possibly, in the future, the range of study may be so extended as to include the knowledge of the various alloys of metals, modes of application of chemicals by which effects in metals are produced, and other instruction beyond the creation of design, but that is not yet determined.

Bessemer Steel Cutlery.—The following appears in the Sheffield Independent of March 13th:

To the Editor.—On reading the Ironmonger of February 14th, I was surprised to find its special correspondent for Sheffield state "on the authority of one who should know, that 50 per cent. of the cutlery made in Sheffield is from Bessemer steel."

As this statement has (through the medium of the above journal) been circulated at home and abroad, and is calculated to injure the cutlery trade of this town, I hope some of our manufacturers will contradict it. I believe there are hundreds of them who never used such steel, as plenty of steel manufacturers can testify.

Yours truly,
JOHN BLADE,
Clintock Works, Sheffield, March 12, 1880.
This suggests the inquiry, what proportion of the Sheffield cutlery is of Bessemer steel? If one-half is too large a figure,

SEYMOUR'S SHEARS AND SCISSORS.



HENRY SEYMOUR CUTLERY CO.,

MANUFACTURERS OF

Full Nickel Plated and Maroon
Japan Handle

Shears & Scissors

EVERY PAIR WARRANTED.

Sold by Hardware dealers throughout the country.

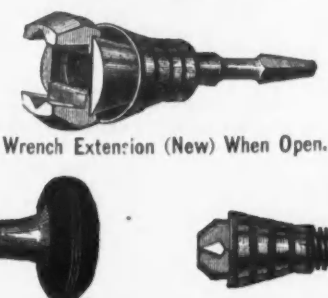
Salesrooms,

84 and 86 Chambers Street, New York City.

Manufactory, HOLYOKE, MASS.



Q. S. BACKUS' New Improved Bit Braces, Ratchet Braces, Bit Brace Wrenches, Angular Borers, &c.

Send for
Catalogue and
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Plain Brace.

Wrench Extension (New) When Open.

Backus'
Bit Brace
Wrench.Backus'
New Ratchet
Brace.All Bit Brace
Wrenches are
Nickel-Plated.

Having done away with the objectionable *Inner Jaws*, which we found could not be applied with entire satisfaction to all kinds of Bits, we take pleasure in presenting to the mechanic a Brace which, by its adjustability to *every style and size of Bit*, makes it absolutely perfect, and we think the best Brace ever offered in the market.

Some of my friends and customers having made inquiries with regard to certain published threats, referring to a patent decision on my old and discarded styles, I take pleasure in announcing that they need have no apprehension from that source whatever.

No mechanic should be without this tool, combining as it does all the advantages of the regular Bit Brace, holding firmly Bits of all sizes, from the smallest to the largest, while at the same time it is a perfect Socket Wrench, with which Nuts and Bolts from 1/4 to 1 1/4 inches can be turned with great rapidity, and to a great extent doing away with the need of the old-fashioned screw wrench.

Having done away with the objectionable two pawls worked by a lever, which was often found to be in the way, we now offer a ratchet which we feel cannot possibly be improved; using but one pawl worked by a simple ring, by turning which from one to the other of the three small notches, you set the ratchet so as to work either to the right, left, or stand rigid.

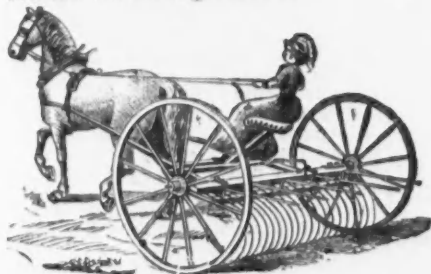
Q. S. BACKUS, 102 Chambers Street, New York.

NEW YORK STATE AGRICULTURAL WORKS, Established 1830.

LA DORR'S



Jointed Pulverizing Harrow.



Eagle Rake.

WHEELER & MELICK COMPANY,

Patentees and Manufacturers of

Railway & Lever Horse Powers, Wheeler's Vibratory Threshers & Cleaners.

Ellis's One and Two-Horse Threshers and Cleaners, Threshers and Shakers, Straw-Preserving Rye Threshers, Eagle Hand and Horse Dumping Rake; La Dorr's Jointed Pulverizing Disc Harrow, the only Disc Harrow that will thoroughly pulverize the ground, leave it smooth and cover the seed; Tolley's Champion One and Two-Horse Cultivator with patent screw teeth Steam Engines, Dog and Pony Powers, Wood Sawing Machines, Shingle Machines; La Dorr's Disc Corn Cultivator, unequalled by anything for cultivating corn or any rowed crop. All machines made of first-class material, and are the best machines for export and home trade. Having been established nearly fifty years, our reputation is second to none.

Send for illustrated circular and report of Centennial Trial.

WHEELER & MELICK COMPANY,

Albany, N. Y., U. S. A.

WHEELER'S
MEDAL MACHINES.
NEW YORK STATE AGRICULTURAL WORKS.

Horse Power and Thresher and Cleaner.



Tolley's Champion Cultivator.

THE HARTFORD COMPRESSED-AIR PUMP.

Water Driven to any Height and Distance by Compressed Air.

Country Houses Supplied Cheaply and Certainly for Bath Rooms, Water Closets, Hot and Cold Water Faucets, &c.

Plenty of Fresh Water for Stock on Farms.

The Best Pump for Irrigating, Supplying Railroad Tanks and for Mining Purposes.

This pump is being introduced into all the foreign countries, and is accepted by all mechanical men as the very best Pump in the market. It is more durable and needs less repairs than any other apparatus for like purposes, and is therefore the cheapest in the end, if not at first. Its advantages over other Windmills, Rams, and other contrivances for raising water, are quickly seen. For Circular and Price List address

THE HARTFORD COMPRESSED-AIR PUMP CO.,

EZRA BROOKS, Sec. and Gen'l Manager,

HARTFORD, CONN., U. S. A.

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Send for price list, stating what you want.

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Speaking Tube Whistles,
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MINERS' CANDLES.

Superior to any other Light for Mining

Purposes. Manufactured by

JAMES BOYD'S SON,

Nos. 10 & 12 Franklin St., New York.

PRESSED STEEL

GEARING.

Most powerful, accurate, durable and

cheapest. Any shaped teeth.

J. COMLY, Patentee,
LINCOLN PARK, N. J.No. 35
BROWNING, SISUM & CO., 85 Chambers St.,
Manufacture

Belt Hooks, Cotters, Spring Keys, D Rings,
Staples, and every thing pertaining to wire bending.
Factory, BROOKLYN.

CROSS CUT SAWS.

Caution to Manufacturers of, Dealers in, and Users of Cross-Cut Saws and One-Man Cross Cuts:

Dealers in and Manufacturers of Saws, and Hardware Dealers generally, are hereby notified that the undersigned are the owners of the reissued Patent for Saw Handles, No. 8996, Nov. 18, 1879, original patent, Jan. 18, 1870.

Every Cross-Cut Saw having a handle, part of which, adapted to one hand, is above the blade, and part, adapted to the other hand, opposite the end of the blade, is an infringement of the said patent, and prompt legal proceedings will be taken against manufacturers of and dealers in saws provided with such handles.

The following is the claim on which we rely:
"In a cross cut saw, the combination of the saw-blade with a handle, part of which, adapted to one hand, is above the said blade, and part, adapted to the other hand, directly opposite the end of the said blade, all substantially as set forth."

HENRY DISSTON & SONS,

KEYSTONE SAW WORKS, Philadelphia, Feb. 17, 1880.

HOWSON & SON, Philadelphia and Washington, Attorneys for DISSTON & SONS.



Bergen Port Spelter

MINES: Lehigh Valley, Pa. WORKS & FURNACES: Bergen Port, N. J.
The only Miners and Manufacturers of

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LEHIGH SPELTER

From Lehigh Ore.
Especially adapted for

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BERGEN PORT OXIDE ZINC.

superior for Liquid Paint on account of its body and wearing properties.

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E. A. FISHER, Agent, 13 Burling Slip, N. Y.



Lemon Squeezer.

A New and Important Invention.

The operation is by a presser lever, standard link-supporting ring, guide rods, a cup, convex bed perforated. The lemon is cut in half, and the edges are spread out when pressed; this insures uniformity of pressure, breaking the cells of the lemon and extracting all the juice. A box of lemons can be squeezed in twenty minutes.

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PECK & REMIS, Jobbers of Rubber Goods,

manufacturers of Leather Belting and Leather

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Tanned Belting, also N. Y. Belting and Packing Co.'s

goods. Ladies' and Gents' Water-proof Garments,

176 Superior St., Cleveland, O.



DEARBORN'S

Pat. Adjustable Blind Awning Fixtures.

These goods are now well established in the market,

having been in use for three years. For Price List of

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FOR MELTING IRON. Please

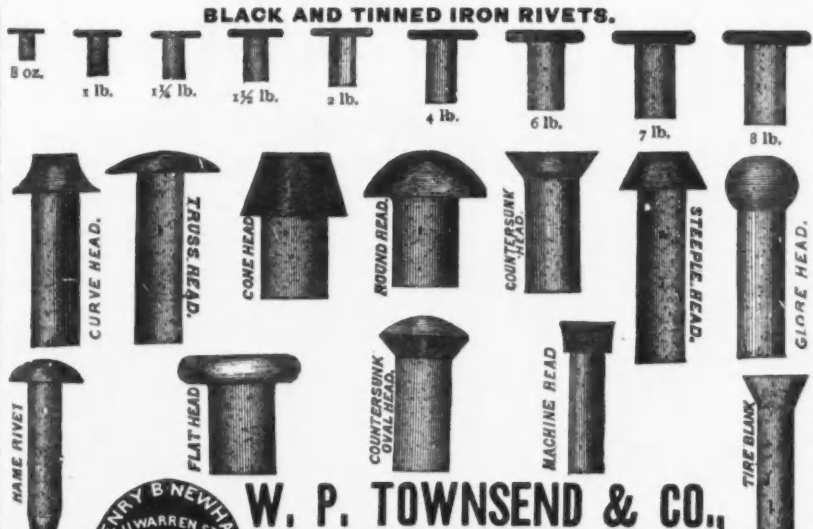
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BLACK AND TINNED IRON RIVETS.
8 oz. 1 lb. 1 1/2 lb. 2 lb. 3 lb. 4 lb. 6 lb. 7 lb. 8 lb.
CURVE HEAD. TUBS HEAD. CONE HEAD. ROUND HEAD. COUNTERSINK HEAD. MACHINE HEAD. STEEP HEAD. GLOBE HEAD.
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Manufacturers of every description of First Quality
RIVETS.



"PINNACLE"
SASH LOCK.
BURGLAR PROOF.
In locking, the arm is brought forward, and the spring bolt engages with the post in the back plate. In unlocking, the knob is pulled out, and the arm throws back, where it is held. Only one spring is used in the lock.
PAYSON
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Iron and Brass Wood Screws.

We manufacture a full line of

IRON AND BRASS SCREWS.

Quality, finish and tests as to strength, guaranteed equal to any

in the market.

With improved facilities and largely increased capacity for

production, we can fill orders promptly, and invite inquiries for

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See first issue of The Iron Age each month.

The Billings Oil Stove Patent.

We have received the following circular relating to a matter in which a great many of our readers are interested. We have not in any way examined the question, and are unable to give our readers any information on the subject to which the circular relates:

Office of TRIFT & HOWARD and
KEROSENE LAMP HEATER CO.,
12 Murray Street,
New York, March 20, 1880.

We are pleased to announce to the trade that the Commissioner of Patents has granted a reissue of the well-known Billings patent, so as to correct all the defects in the wording of the claims of the patent, pointed out by Judges McKennan and Blatchford. On the hearing of the later of the two cases (that against James L. Sharp) Judge Blatchford said:

"I understand all these old things and know just what they are, and the only thing in dispute here is, what is the true construction of the Billings patent. Judge McKennan does not disparage the Billings invention, and does not disparage the Billings stove. The question is not whether you cannot, by reissue of your patent, cover what you have invented; but the question is whether you have not, by the language of your claims and of your patent, so constructed, so formed it, that you have failed to obtain the patent you supposed you had obtained. That is the whole story, all there is of it, boiled down to a few words."

In the light of these decisions, and of the state of the art, as disclosed by the evidence in the cases before those judges, the Patent Office has decided, after most thorough and exhaustive investigation, that the patentee is entitled to the comprehensive claims appended. The patent, thus amended, is the exclusive property of this company. It will be readily seen by all dealers and manufacturers that these amended claims cover every coal-oil stove in the market. We shall look to dealers personally for profits and damages for every stove sold in violation of our rights, and costs of suit—if suit should be necessary—and for such exemplary damages as the court has power to impose; for after the thorough investigation that this subject has received, dealers cannot plead ignorance of our rights, and can have no excuse for selling stoves made by infringers. The largest and most important manufacturers, with few exceptions, are licensed by us, and dealers will, therefore, have no difficulty in obtaining oil stoves in great variety, which they will be perfectly safe in selling.

All stoves hereafter manufactured by our licensees will have the following tag attached:

LICENSED BY THE K. L. H. CO.,
PATENTED JAN'y 17, 1865.
REISSUED MARCH 16, 1880.
UNDER THE BILLINGS PATENT.

Dealers are, of course, at liberty to sell such stoves as they may have on hand heretofore made by our licensees, with either of our former license tags attached.

THE KEROSENE LAMP HEATER CO.

CLAIMS OF THE BILLINGS PATENT, AS AMENDED BY REISSUE NO. 9121, MARCH 16, 1880.

1. In a coal-oil stove, the elongated air guide, in combination with and adapted to conform to the flat wick tube, substantially as described.

2. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having a flat wick tube, the elongated air guide, in combination with and adapted to conform to the flat wick tube, and a flue or chimney above the air guide.

3. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having a flat wick tube, the elongated air guide, in combination with and adapted to conform to the flat wick tube, and a flue or chimney above the air guide, said flue or chimney being closed at its bottom, except at the air guide opening.

4. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having a flat wick tube, the elongated air guide, in combination with and adapted to conform to the flat wick tube, a flue or chimney above the air guide, and supports to hold a vessel or thing to be heated over the chimney, so as not to obstruct the draft.

5. In a coal-oil stove, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, substantially as described.

6. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, and a flue or chimney above the air-guides.

7. In a coal-oil stove, the diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, said diaphragm being closed, as herein shown, except at the air-guide openings.

8. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having two or more flat wick tubes, the diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, said diaphragm being closed, as shown, except at the air-guide openings, and a flue or chimney above the air-guides.

9. In a coal-oil stove, the horizontal diaphragm containing two or more of said elongated air-guides, and having a space for the passage or circulation of air above and below it, substantially as shown and described.

10. In a coal-oil stove, a horizontal perforated diaphragm placed below the stove or range body and the air-guide diaphragm and above the lamp, having a cold-air space between said perforated diaphragm and the top of the lamp, substantially as described.

11. In a coal-oil stove, the combination, substantially as described, of the following

elements: A kerosene-oil lamp having a flat wick tube, the elongated air-guide, in combination with and adapted to conform to the flat wick tube, a flue or chimney above the air-guide, and the horizontal diaphragm containing two or more of said elongated air-guides, having an air-space above and below it.

12. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having a flat wick tube, the elongated air-guide, in combination with and adapted to conform to the flat wick tube, a flue or chimney above the air-guide, and supports to hold a vessel to be heated over the chimney so as not to obstruct the draft, and the horizontal diaphragm containing two or more of said elongated air-guides, having an air-space above and below it.

13. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, a flue or chimney above the air-guides, and the horizontal diaphragm containing two or more of said elongated air-guides, having an air-space above and below it.

14. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, a flue or chimney above the air-guides and the horizontal diaphragm containing two or more of said elongated air-guides, having an air-space above and below it.

15. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp having two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, said diaphragm being closed, as shown, except at the air-guide openings, a flue or chimney above the air-guides, and the horizontal diaphragm containing two or more of said elongated air-guides, having an air-space above and below it.

16. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp, having two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, said diaphragm being closed, as shown, except at the air-guide openings, a flue or chimney above the air-guides, and the horizontal diaphragm containing two or more of said elongated air-guides, having an air-space above and below it.

17. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp containing two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, a stove or range body divided by partition or partitions into a succession of flues or chimneys above the air-guides, adapted to convey heat directly to the thing to be heated.

18. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp containing two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, and a stove or range body divided by partition or partitions into a succession of flues or chimneys above the air-guides, adapted to convey heat directly to the thing to be heated.

19. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp containing two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, said diaphragm being closed, as shown, except at the air-guide openings, and a stove or range body divided by partition or partitions into a succession of flues or chimneys above the air-guides, adapted to convey heat directly to the thing to be heated.

20. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp containing two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, a stove or range body divided by partition or partitions into a succession of flues or chimneys above the air-guides, adapted to convey heat directly to the thing to be heated, and the diaphragm containing two or more of said elongated air-guides, having an air space above and below it.

21. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp containing two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, a stove or range body divided by partition or partitions into a succession of flues or chimneys above the air-guides, adapted to convey heat directly to the thing to be heated, and the diaphragm containing two or more of said elongated air-guides, having an air space above and below it.

22. In a coal-oil stove, the combination, substantially as described, of the following elements: A kerosene-oil lamp containing two or more flat wick tubes, a diaphragm containing two or more of said elongated air-guides, in combination with and adapted to conform to the flat wick tubes of the kerosene lamp, said diaphragm being closed, as shown, except at the air-guide openings, a stove or range body divided by partition or partitions into a succession of flues or chimneys above the air-guides, adapted to convey heat directly to the thing to be heated, and the diaphragm containing two or more of said elongated air-guides, having an air space above and below it.

23. In the kerosene-oil stove or heater, in combination with the diaphragm containing two or more of said elongated air-guides, and chimney, the flat wick tube or tubes connected with the oil reservoir without the intermediary of caps and collars, substantially as shown, and for the purposes described.

[The foregoing has no bearing on the Fish Patent Reissue, No. 7069, dated April 15, 1876, and our rights thereunder. Dealers who have not already settled are liable to us under the Fish patent for all stoves sold by them prior to June 17, 1879, when that patent expired, except such as were made by our licensees.]

The Tribune has taken to mining, but we fear with more zeal than discretion when it allows statements like the following, which might mislead even an expert, to go forth: "The Bessick ores are tellurides of gold and silver, 70 per cent. gold and 30 per cent. silver." The knowing ones will rest content, but the would-be critical outsider may look wise and ask for the whereabouts of the tellurium.

J. R. TORREY, Manufacturer of Razor Stropps.

Office and Factory, 31 Southbridge St., Worcester, Mass.



Superior to any other in the market.

Our Stropps, in quality, style and variety are unequalled, and we have facilities for production greater than any other manufacturer in our line. Price Lists on application.

J. R. TORREY RAZOR CO.,

Office and Factory, 34 Southbridge St., Worcester, Mass.



No. 451 I.



No. 10

Our Razors, in temper and workmanship, are not surpassed by any of foreign make, and are fully guaranteed in every respect. Price Lists on application.

THE SPRAGUE NOVELTY WORKS, Rochester, N. Y.,

SOLE MANUFACTURERS OF

Sprague's Perfection Razor Strop.

Sprague's Combination Razor Strop.

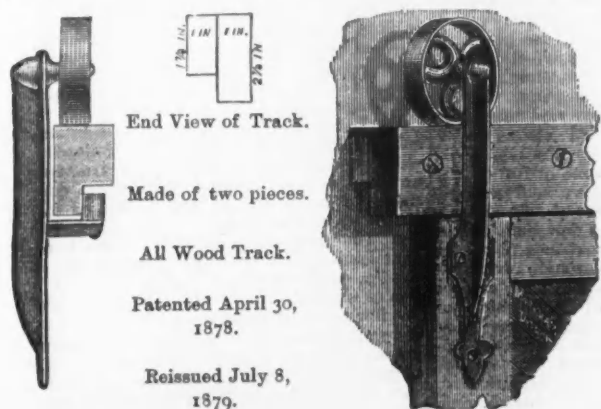
Sprague's "Iron Bound" Boot Polish.

Sprague's Combination Ice Tool.

Sprague's "Star" Metallic Post Box.

WIRE POTATO MASHERS, HATCHET HAMMERS, WIRE RING POT CLEANERS, &c., &c.

Send for prices and illustrations of each and everything we make.



End View of Track.

Made of two pieces.

All Wood Track.

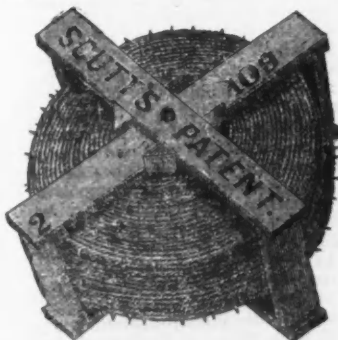
Patented April 30, 1878.

Reissued July 8, 1879.

THE KIDDER SLIDE DOOR HANGER.

No Iron Rail and Cannot be thrown off the Track, Thereby saving great annoyance to the user and cost of iron rail. The small anti-friction wheel keeps the door in place, preventing side friction. The Hanger can be put up in less time, runs with less noise and as easily as any other hanger made. For sale by the Wholesale trade generally, and the

KIDDER SLIDE DOOR HANGER CO., Romeo, Mich.



SCUTT'S PATENT FOUR-POINTED STEEL BARBED CABLE FENCE WIRE.



The cable is formed in the same manner as the great cables used in bridges, and has a tensile strength double that of any twisted wire. It is the only barbed wire so manufactured. Both wire and barb material are manufactured especially for our use from the finest grade of Siemens-Martin steel. Our wire offers double the protection afforded by any two-pointed barb, each rod giving 128 points, while two-pointed barbs give but 64. It is the most attractive in appearance, and the best selling wire in the market, and, by actual tests, the strongest, lightest and consequently the cheapest.

We manufacture under license from the Washburn & Moen Mfg. Co., and all danger of law suits is avoided in the purchase of our goods. We manufacture both painted and galvanized. The only Solid Steel Four-pointed Barb. Send for circulars and price list.

H. B. SCUTT & CO., Buffalo, N. Y.

THE SLAYTON RAZOR.



This cut is exact size of razor.

PERFECTION

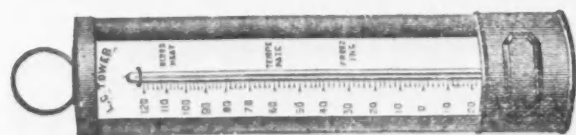
FOR PORTABILITY.
FOR CUTTING QUALITY.
FOR TEMPER.

Handles of German Silver, Nickel Plated. Blades of the Finest Steel in the World. Every Razor Fully Warranted.

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Canvassers Wanted.

39 Exchange St., Rochester, N. Y., Sole Agent.



L. C. TOWER

Manufacturer of

Thermometers

Of Every Description,
Rochester, N. Y.

PENFIELD BLOCK WORKS,

LOCKPORT, NEW YORK,

MANUFACTURERS OF ALL KINDS OF

TACKLE BLOCKS

FOR THE
HARDWARE & EXPORT TRADE.



No. 5—Rope straddled block, 1 1/2 in. or Iron Sheaves



Improved Pat. Iron Sheaves (steel rollers),
The Giant Car Pusher,
The West Patent Lock Faucet,
Carpenters' Mallets,
Ten Pins and Ltg. Balls.

Send for Illustrated Catalogue and Price List,
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No. 5—Inside iron strapped block, 1 1/2 in. or Iron Sheaves

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(ESTABLISHED 1823.)

HEADQUARTERS FOR SCYTHE, AXE, KNIFE, HACKER AND TOOL STONES.



Twenty Quarries and Four Factories in New Hampshire and Vermont.

Strong, Clear Grit Stone
that will not glaze.

PRICES & QUALITY GUARANTEED
All Goods Genuine Brands.

My customers may rely upon being squarely dealt with and getting no poor, unsuitable imitations.

LIST

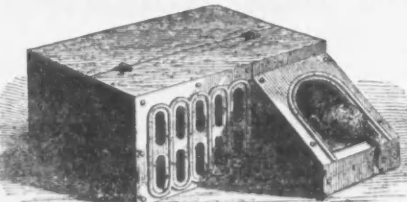
No. 1, Extra Indian Pond.
No. 2, " "
No. 3, " "
No. 4, Premium.
No. 5, Union.
No. 6, White Mountain.
No. 7, L'Étoile.
No. 8, Diamond Grit.
No. 9, Hacker (Round).
No. 10, Lamolite.
No. 11, Willoughby Lake.
No. 12, Green Mountain.
No. 13, Black Diamond.
No. 14, Ragg.
No. 15, Moving Machine.
No. 16, Paper Mill Stone.
No. 17, Vermont Darby.
No. 18, " Chocolate.
No. 19, " Axe Bitts.
No. 20, N. H. Chocolate.
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Stones manufactured, labeled and branded in any manner desired.

The only Manufacturer of Genuine, Old-Reliable Indian Pond (Red End).

Beware of Coarse Brittle Imitations.

Delusion Rat and Mouse Trap,



Formerly manufactured by

CLAUDIUS JONES & CO.,

At Bridgeport, Conn.,

Have Removed to ERIE, PA.

This is the most successful Rat and Mouse Catcher on the market.

Send for Price Lists.



Spofford's Patent Bit Brace.

Manufactured by
FRAY & PIGG,
Bridgeport, Connecticut, U. S. A.

All Iron, Four Sizes. Rosewood Head and Handle;
No. 7... 7-inch sweep. No. 10... 7-inch sweep.
No. 8... 8 " No. 11... 8 " " " " "
No. 10... 10 " No. 12... 10 " " " " "
No. 12... 12 " No. 14... 12 " " " " "
No. 14... 14 " No. 16... 14 " " " " "

Grant Fan Mill & Cradle Co.

Manufacturers of
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TURKEY WING GRAIN CRADLES,
4, 5 and 6 fingers.
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4, 5 and 6 fingers.
SOUTHERN PATTERN GRAIN
CRADLES,
4, 5 and 6 fingers.
All of a superior quality.
None genuine unless marked
Grant Fan Mill and Cradle Co.
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"RIGHT SPEEDY" CORN SHELLER

Is the best Hand Sheller
made; does the best work
and works the best; is war-
ranted five years.
Agents Wanted in every County.
Sample sent on receipt
of \$3.00.
Specially adapted for export.
Address Patentee and Sole
Manufacturer,
CURTIS GODDARD
Alliance, Ohio, U. S. A.

NEW PUBLICATIONS.

ANNUAL REPORT OF THE CHIEF OF THE BUREAU OF STEAM ENGINEERING FOR THE YEAR 1879. Navy Department, Washington.

The annual report of the Chief of the Bureau of Steam Engineering is of more than ordinary interest, and as it contains the records of some valuable experiments which are of direct interest to many readers of *The Iron Age*, we may be permitted to refer to it at some length. The first part embraces a report made by Chief Engineer A. Henderson and J. H. Long, and Passed Assistant Engineer H. N. Stevenson, on the machinery of the United States double-turreted monitor Miantonomoh. A description of the engines, boilers, &c., of the monitor is given, and elaborate tables of the dimensions and weights of the machinery are added, together with 36 well-executed plates, showing elaborately their construction. This is followed by an extended report on experiments in boiler bracing—a report which, we may add, has been separately printed in book form. Chief Engineer J. F. Sprague and Passed Assistant Engineer G. E. Tower, who were appointed to make a series of experiments to determine the value and resistance of screw stay-bolts for boilers under different conditions, using iron, steel and copper plates of different thicknesses, have very creditably acquitted themselves of the work committed to their care. The apparatus used was a composition ring, 4 inches deep, 18 inches internal and 23 inches external diameter, faced true on both sides. To this ring the plates to be examined were firmly and tightly bolted by thirty-one 7/8-inch steel bolts. The circular box thus formed, in imitation of a section of a fire-box of a boiler, was exposed to internal hydraulic pressure. With the greater number of experiments only one side of the box was composed of the plate to be tested, the other being a 3/4-inch steel plate, through which the stay-bolts were passed, and to which nuts were firmly screwed before the riveted head was made on the other end of the bolt. The tests show the comparative resistance of iron screw stay-bolts of varying thickness and varying distances from one another, pulled through iron boiler plates of different thicknesses; second, the results of pulling iron screw stay-bolts through "low" steel boiler plate; third, the results of pulling copper screw stay-bolts through iron boiler plates; fourth, copper plates and iron bolts, and fifth, copper plates and copper screw bolts. A series of tests were also made with Otis steel plate and Otis screw bolts. It is to be regretted that these tests are not summarized in a manner which would present a convenient way of comparing the results. The material collected and laid down in the tables and in 46 plates is very large, and we shall at an early opportunity attempt to place the results before our readers in a more accessible form. We have already repeatedly referred to the interesting conclusions reached by the committee on the best form of rivet head, and need not at this juncture repeat the experiments made. Suffice it to say that they demand the careful attention of boiler makers, who, we trust, will convince themselves by actual trial of the value of the improvements suggested.

A second appendix affixed to the report is the record of a series of experiments, conducted also by Messrs. Sprague and Tower, to ascertain the proper proportions for the ends of boiler braces. In this case also, the tests are exhaustive and of much importance, although the report embraces scarcely more than a bare record of the facts observed, and is, we believe, capable of being very profitably elaborated. A series of experiments made show the uncertainty attending the use of boiler braces with eyes formed by drawing out the bar under the hammer, bending and welding it around a mandrel. The superiority of braces with eyes formed by cutting them from the flat bar is clearly demonstrated.

EISEN UND STAHL. (Iron and Steel). By Anton Ritter Von Kerpely. Arthur Felix, Publisher, Leipzig.

Though a tardy contribution to the literature of the Paris Exhibition, Herr Kerpely's report to the Hungarian Ministry of Finance is a more ambitious work than those usually prepared by the representatives of foreign governments to International Exhibitions. He has seized the opportunity offered to him to study, with the eye of a trained metallurgist and original investigator, a large number of French works visited by him personally, and has taken pains at the same time to embody in his work abstracts of the more important contributions to metallurgical literature on the process and the plant used in French works. It has been a subject of general comment on the part of those who went to Paris, that very little was shown that had not previously been fully described in technical journals and before scientific bodies, and the plan followed by Herr Von Kerpely was probably the only one likely to elicit information that would be offered with any show of success. We are inclined to consider the result of his labors, the work now before us, the most complete and truly representative yet published, and while much of what it contains in the way of descriptions of plant and processes has been placed before our readers in the course of the last few years, we may be permitted to give a brief outline of the contents of the work. Following in the main Prof. Jordan's well-known classification of the French iron mines and metallurgical works, as presented in his paper before the Iron and Steel Institute, Herr Kerpely refers to the salient points of the methods of manufacture of each prominent establishment. He gives numerous details and many well-executed drawings and sketches of the plan of the works visited, the furnaces used, &c. Among others we notice the Danks-Bouvard furnaces of Creusot, the 80-ton steam hammer at the same establishment, the Guyenet furnace hoist, a modification of the Whitwell hot-blast stove; Lencauze's modification of the Cowper stove, &c. Herr Kerpely repeats fully Mr. Holley's valuable paper on the Terrenoire process of producing sound steel castings, the elaborate experiments made at the same works to trace the effect of varying amounts of phosphorus, carbon, silicon and

manganese upon the mechanical properties of steel, and the rolling of trapezoidal armor plate at St. Chamond. This detailed description of the French establishments is followed by an interesting review of the progress of metallurgy, which includes some experiments made with Reschitz iron and steel by Bauschinger, Thurston's well-known investigations on the Salisbury iron, and also the classical experiments on Swedish steel conducted under the auspices of the Jernkontoret, by Dellwik and others. Herr Kerpely's work shows that he is not alone a clever compiler, but that he is a careful and keen observer, and we are pleased to notice that he appears to have made the organizations existing in France to provide for the welfare of invalids, orphans, widows and the sick, a subject of special study.

POCKET MINING ATLAS. By Edwin Bolitho. New York: The Scientific Publishing Company. Price \$1.

A collection of maps of the most important of our Western mining districts, including Deadwood in Dakota, the San Juan, Leadville, Central City, Silver Cliff, Caribou in Colorado, the Comstock, Eureka, Treasure Hill and Tuscaraora in Nevada, the Bodie district in California, and maps of Montana, Idaho, Utah, New Mexico and Arizona. Notwithstanding their small size, about 3 by 5 inches, the maps are clearly printed and well tinted. We learn that, whenever possible, individual companies have been consulted and official drawings have, in every instance, formed the basis of each part of the work.

SECTIONS OF MALLEABLE IRON AND STEEL. D. & W. Robertson, Dundee, London, and Sydney, N. S. W.

A neatly bound and well-printed illustrated catalogue of the sections of malleable iron and steel, angles, tees, channels, plates and shapes manufactured by the firm of D. & W. Robertson.

Our Imports of Iron and Steel.

The statistics of our imports of iron and steel during the first two months of this year—January and February—should be carefully studied by domestic manufacturers of these products and by those who make our tariff laws. They indicate a most unhealthy condition of trade—one which, if continued into the summer, will work incalculable mischief. How immensely these imports have increased will be seen from an examination of the following table of British exports to the United States in January and February:

ARTICLES.	Month of Feb.			Jan. and Feb.		
	1878.	1879.	1880.	1878.	1879.	1880.
Pig iron.....	1,052	8,102	69,651	5,580	6,350	126,221
Old iron.....	191	381	29,529	220	597	44,521
Steel, unwrought.....	424	307	2,008	728	775	5,550
Tin plates.....	7,256	9,137	10,247	5,722	18,132	27,270
Hoops and sheets.....	47	36	4,957	89	89	9,942
Bar, angle, bolt and rod.....	233	31	6,526	1,122	191	13,345
Iron and steel rails.....	3	737	12,842	3	812	26,169
Total.....	10,108	15,732	139,676	21,554	26,929	264,948

The above figures do not represent all of the iron and steel imported in January and February, but, with the exception of rails, they show much larger importations than took place during the corresponding months of 1872 and 1873. We all know what the excessive imports of those years resulted in. The month of March, too, which is just closing, is yet to be heard from, and from fragmentary information at hand in English newspapers and from other sources, there is every reason to believe that it will prove to be as satisfactory to British ironmasters as either January or February.

Our imports of iron and steel in the year 1879, mainly in the last four months of the year, were also on a very large scale. We quote below the British exports of these products to the United States during that year:

Articles.	1877.	1878.	1879.
	Tons.	Tons.	Tons.
Pig iron.....	35,953	32,563	275,008
Old iron.....	3,167	1,888	177,842
Steel, unwrought.....	6,263	4,905	9,305
Tin plates.....	106,593	108,123	155,795
Hoops and sheets.....	5,079	1,021	10,450
Bar, angle, bolt and rod.....	8,877	4,628	21,630
Iron and steel rails.....	2,525	681	44,998
Total.....	165,457	153,978	697,024

Already, as the result of the heavy importations and increased production of this year and of the closing months of 1879, prices of iron and steel have commenced to decline. This is not to be regretted, if the decline shall prove to be gradual and moderate, for all prudent business men agree that prices have been forced up too high by speculation and excitement, resulting from a sudden and unexpected demand. But prices will not decline gradually and moderately, but rapidly and ruinously, if large importations of foreign iron and steel continue. These will undoubtedly continue, even if duties remain as they are, if manufacturers, iron ore producers, and coke makers should attempt to push prices above the figures at which sales are now actually being made. An attempt to create another "boom" would most certainly stimulate further extraordinary importations, and with a glutted market in midsummer the bottom would fall out of everything. It will be safer, and therefore wiser, to stimulate consumption, and at the same time to put a check on importations by frankly recognizing the fact that the iron famine which existed in this country during the closing months of 1879 does not exist now. We believe that this course will be pursued with the opening of spring business, and that importations will in consequence thereafter decline if the tariff be not disturbed. A reduction of the tariff would keep importations up to their present volume for several months, with the certain effect which has been indicated. English prices have of late steadily declined.—*Bulletin American Iron and Steel Association.*

The Warwick Iron Company are shipping ore from their Boyertown (Pa.) mines at the rate of five cars per day.

INDUSTRIAL ITEMS.

MAINE.

The Katahdin Iron Works have never been so busy as now. A new deposit of great richness has recently been found. Twelve tons of pig iron are being hauled from the works every day. The iron is selling rapidly in the market. It is used in the manufacture of car wheels, for which it is especially fitted.

MASSACHUSETTS.

The Consolidated Safety Valve Company, of Boston, is doing a large business, manufacturing their nickel-seated "Pop" safety-valves, of which they make a specialty. They inform us that every engine on the Pennsylvania Railroad is supplied with a pair of their valves.

Among manufacturing establishments which have recently introduced the Electric light, is that of the Fitchburg Steam Engine Company, of Fitchburg. The machine for lighting the shop is a four-light machine, each light being equal to 3000 candles. The whole lighting power is equal to 700 gas jets. The amount of power required to run the machine is about three-fourths of one-horse power for each light, or three-horse power for the four lights required to light the shop.

Some interesting experiments are going on at the Holyoke water-power company's flume to determine how much power is lost by transmission through gear and belts.

E. W. Wood, a leading Easthampton merchant, talks of starting a manufactory of cutlery in connection with his brother, who is superintendent of the Bay State Cutlery Works at Northampton. The choice of location now lies between Easthampton and Northampton, and very advantageous terms have been offered in the latter town.

CONNECTICUT.

The annealing shop of the New Haven Wire Company's Works at East Haven, which was recently burned, is to be replaced by two smaller buildings, and an addition 65 by 75 feet is to be built.

The Winchester Repeating Arms Company, of New Haven, is making 100 guns a day on a contract for 20,000.

The Weed Sewing Machine Company, of Hartford, are running until 10 p. m. Every department is full, and the forging shop is being doubled in capacity. With their increased facilities they will be able to turn out 200 Columbia bicycles per week, and 100 of the Weed sewing machines per day.

The Hendey Machine Co., Wolcottville, are about to build an addition to their works 30 by 40 feet, two stories high. They are very busy—full of orders—but complain of the scarcity of machinists. The Union Hardware Company, the Turner & Seymour Manufacturing Company, and the Excelsior Needle Company, of the same place, are all very busy.

NEW YORK.

William Terwilliger, of Terwilliger & Co., safe makers, has made an assignment to John W. Mossman. Mr. Terwilliger has been in the safe business for 30 years, but for the past four years has been hard pressed, and in August last his partner, J. M. Hunt, retired. A judgment for \$1166 in favor of J. J. & W. Astor was filed on Monday. Bradstreet's reports state that the holder of a chattel mortgage foreclosed last week, and all the effects were advertised to be sold on Friday last, but the creditors took the matter in hand and settled, so that the sale was postponed for two weeks. The creditors are endeavoring to form a stock company to continue the business. The assignee states that negotiations have been in progress among the creditors for several weeks past to form a stock company, but the factory was damaged by fire on the 15th inst., causing a loss of \$3000, which precipitated the assignment. The liabilities are about \$20,000, and the assets consist of machinery and stock, the value of which mainly depends on the continuance of the business. The creditors are friendly, and he thought matters would be satisfactorily settled in a short time.

Meneely & Co., the well-known bell foundry, of Troy, are casting a \$2500 bell for St. Luke's Episcopal church, Scranton, Pa., and one weighing 3000 pounds for the Catholic church, of Lakeville, Conn. The firm has nearly completed a chime of bells for St. Joseph's Catholic church, Toledo, Ohio.

The Napanoch Rolling Mill, which was started up February 26, is running night and day, and everything is working satisfactorily. It is expected to turn out about 15 tons of iron per day. This mill, situated in Ulster County, was formerly a forge, but was converted into a rolling mill and run as such for some time, being operated by water power. Just previous to the panic, about eight years ago, it was enlarged and steam power was put in, but the owner dying, the mill remained idle until the present organization, the Napanoch Rolling Mill Company, bought and commenced to operate it. They have a large amount of orders already on hand.

The new puddling forge of H. Burden & Sons, at Troy, is being roofed, and will go into operation about the first of this month. There will be 14 puddling furnaces in this forge. Four of them are running now, and the balance will be started soon.

The Saranac Horse Nail Works, at Plattsburgh, are to be enlarged.

NEW JERSEY.

The West Bergen Steel Works, at West Bergen, Hudson County, are being rapidly pushed to completion. The proprietors are Messrs. Spaulding, Jennings & Co. It will have two heating furnaces, with 12 steel-melting holes, two hammers and two trains of rolls, and its annual capacity will be 1500 tons.—*Bulletin of American Iron and Steel Association.*

PENNSYLVANIA.

The large Rodman Furnace was put in blast on Wednesday, the 24th ult. This furnace has undergone thorough repairs, and is one of the largest in the country. There is a very large stock on hand to operate the large furnace, which is 66 x 14. The small furnace has been doing remarkably well.

There are rumors of still another blast furnace on the Delaware River Railroad,

either in South Chester or Chichester township, and that the Reading Railroad Company have offered the proposed company 20 acres of land at a nominal figure, and already \$75,000 worth of stock has been subscribed.

The second blowing in of the Bennett furnace at Port Carbon, on the 10th ult., mentioned in our issue of the 18th, has, like the first, proven unsuccessful. The cause of the failure is assigned to the fact that the engine was incapable of blowing in enough air at the required pressure, and that the hotoven was not sufficient to raise the temperature above an average of 600° F. at the tuyeres. The furnace, which is 13 x 65, is now in the hands of the P. & R. C. & I. Co., who, it is said, intend to alter its shape.

Rumor has it that Springhill Furnace, Fayette County, is going to be put in blast as soon as the company can get it ready. The contracts for making and hauling the charcoal have been let.

It is said that Major H. D. Markley, of Fleetwood, has purchased the Chestnut Hill charcoal furnace, in Adams county, and will form a company and put her in blast this spring.

It is stated that the old Mill Hill Furnace, in Clinton county, will go into blast as soon as it can be got ready. It has been idle for 25 years, but as soon as steam can be put in it will start up as a coke furnace. Washington Furnace, near the same place, will also be put in running order during the summer.

The Chester Republican of recent date states that the Eureka Cast Steel Company, of that city, have just finished and shipped to Messrs. J. Wood & Bro., of Conshohocken, for their mill, one of the largest steel gear wheels ever made in the United States. This wheel is 61 inches in diameter on the pitch line and weighs 3 1/2 tons. The casting of gear wheels has been tried repeatedly by other steel manufacturers, but their efforts failed. They have also under way two large crank webs of steel for a mining engine, weighing 5 tons each. Locomotive cross-heads are being made by this concern on a very extensive scale for different locomotive shops and railroad companies throughout the United States. Corrugated plates of steel, weighing 300 pounds each, are made in lots of 100 at a time, and other castings in great quantities, including steel propeller blades and solid propeller wheels.

The Blair Iron and Coal Company, of Hollidaysburg, have finished repairing the lower mill factory at that place, and it is now in operation, after a rest of seven years. The Register says: When this factory gets under way we will have two rolling mills, two furnaces, two nail factories and two foundries in operation. Within two miles, at Frankstown, is a large furnace in operation, and a large rolling mill at Duncansville. These works have all the latest improvements, and are all making full time.

The Valentine Rolling Mill, Jenkins, Schryer & Co., Limited, at Williamsport, is once more in full operation.

No. 2 Blast Furnace, Bethlehem Iron Co., is being rebuilt.

The furnace at Bechtelsville, recently put into blast, is known as the Lawrence Furnace, of Bechtelsville. It is operated by the Pottstown Iron Company, and is doing very well.

The Warwick Furnace was to have been put in blast on the 27th ult.

PITTSBURGH AND VICINITY.

The partnership heretofore existing between Messrs. Jno. C. Kirkpatrick, J. G. Beale and J. C. Wallace, under the firm name of Kirkpatrick, Beale & Co., has been dissolved by the withdrawal of Mr. Beale. The two gentlemen remaining will run the Leechburg mill and conduct the old business under the name of Kirkpatrick & Co.

Pittsburgh has a contract for 14 1/2 miles of large iron pipe to convey water to the 80-stamp mill of the Central Arizona Mining Co., to be built near Wickenburg, Arizona.

The Kittanning Times says there is some talk of erecting a blast furnace on the Bailey farm, just below Manorville. As usual, Pittsburgh parties are at the head of the movement.

The Verona Tool Works have met with such a large demand for their new "steel washers" that they are unable to obtain steel rapidly enough to fill orders. Arrangements now made will soon enable them to supply all demands promptly in future.

The new salt works of Chalfant & Robinson are very busy. These works procure the water from the well sunk some few years since by Spang, Chalfant & Co. for gas. They are at present turning out about 100 barrels of salt per diem.

The Monongahela City Hoe Factory is in full operation, the machinery having at last been put in perfect working order. Seventeen hundred hoes were turned out a few days ago in five and one-half hours.

Andrew Klonan, Superior Mill, is now engaged in rolling 30-pound steel rails for the Denver and Rio Grande Railway. These rails, of which 10,000 tons are to be made, are being rolled out of English rail blooms. The pattern is the most difficult ever made, and the beautiful finish of the rails testifies alike to the skillful workmanship and the excellent quality of steel put into them. The flange is 3 1/4 inches wide and very thin, rendering it very difficult to fill out and roll smoothly without cracks. The rail mill engine is run up to a speed of 95 revolutions per minute, and a rail every 50 seconds is the product of the mill. The blooms are 7 x 7 inches and weigh 600 pounds. They are first bloomed down into a crude I-shape of about 5 inches square, and are then cut into two lengths, reheated and rolled into finished rails.

The Standard Nut Works, on the South Side, have adopted the Brush electric light. McKeesport, near Pittsburgh, expects to receive a charter for her new water works company in a few days.

VIRGINIA.

The Virginians says: Four new iron companies—the Iron Company of Virginia, the Luray Iron Company, the Powhatan Iron Company and the Shenandoah Valley Mining Company—have been chartered by the Legislature of Virginia that has just adjourned, to immediately begin operations on the Shenandoah Valley Railroad.

The name of Panic charcoal furnace has been changed to Whiterock.

OHIO.

The works of the Forest City Steel Company, at Cleveland, is nearly finished, and will probably be in operation the 1st of April. It will have three hammers, and its capacity will be four tons a day. Its product will be crucible steel for edge tools, &c. The officers of the company are: L. Prentiss, president; J. H. Clark, vice-president; E. M. Grant, treasurer; C. M. Vorce, secretary; S. C. Prentiss, superintendent.—*Bulletin of American Iron and Steel Association.*

It is said that steps are being taken to put up a rolling mill at Logan.

The title of the company who recently purchased the rolling mill at Wellsville, is the Wellsville Plate and Sheet Iron Company. It will require about 40 or 50 days to put the mill in running order.

Center Furnace, at Ironton, is being put in order, and will start up about June 1.

The Old Empire Rolling Mill, at Cincinnati, has recently been started under the name of the "Cincinnati Rolling Mills." Two heating furnaces only are in use, making a fine quality of merchant bar, hoop and band iron entirely from scrap. They are making horse-shoe, wagon and carriage-makers' iron a specialty. It is expected that this mill will be enlarged in the near future.

ALABAMA.

The large iron and steel mill which is being erected at Birmingham, will start with 24 puddling furnaces and gas heating furnaces. The management will be the same as that of the Louisville Iron and Steel Works at Louisville, Ky., viz: W. B. Caldwell, Jr., president, and A. J. Moxham, superintendent. Work is being pushed as rapidly as possible, and the mill will soon be in full operation.

KENTUCKY.

Mr. John Armstrong, of Lawrence Co., Ohio, the owner of the Buffalo furnace, in this State, expects to put the furnace in blast this summer.

Kenton furnace has 175 wood choppers employed. She will probably go into blast early this month.

The Norton Iron Works rolling mills and furnace are working. The furnace is making an average of 50 tons of good iron per day.

MICHIGAN.

Both stacks of the Jackson Iron Company, at Fayette, have been in operation for some time, but on account of an accident about the middle of March, one stack had to be blown out. It will be blown in again in about a month.

The Frankfort furnace, has been out of blast for the last three years, but will go into blast with one stack some time this month. It has now about 15,000 cords of wood cut, and will cut about 15,000 cords more this spring.

The Spring Lake Iron Co's furnace, which was built under the supervision of Major H. Pickands, on a plan of his own, was first blown in on the 2d ult., and made 35 tons during one day of the first week. She has since made 51 tons in one day. This is a charcoal furnace, 10 feet 6 inches bosh.

MISSOURI.

Moran & Bro., bolt manufacturers, St. Louis, have recently added to their large works some new and very important machinery. The rush of work was the cause leading to the increased capacity.

The number of stoneware furnaces at the present time in the State is ten, all of which are located in St. Louis. Of this number seven are in full blast and the remaining two are to be blown in soon. Those in blast are the Missouri (two stacks), South St. Louis (two stacks), Meier (two stacks), and No. 3 stack of the Vulcan. The others are the Jupiter and two stacks at the Vulcan.

Quite a good deal of interest has sprung up in connection with the iron industry in reference to reviving certain old and neglected furnaces in the State. The company owning the remains of the Scotia Furnace are making preparations to erect a new furnace in the region of Deutor, Crawford County. During the week several prominent gentlemen interested in the iron trade left the city to visit certain blast furnaces, with a view to purchasing them. If purchases are made, work will be begun at once to get them in readiness for operation.

There are three establishments engaged in the manufacture of barb-wire fence in St. Louis—the Missouri Fence Company, Goulds & Ostrander and the St. Louis Barb-Wire Fence Company. The bulk of the wire used is purchased of the Harrison Wire Company, of St. Louis.

The Missouri Car and Wheel Works have just completed an order of 125 freight cars for the Iron Mountain Railroad. A pretty large order from the Cairo Short Line has also been turned out during the present month.

ILLINOIS.

The rolling mill located in East St. Louis, and destroyed by fire a year ago, is being cleared away, in view of a proposed railroad shop to be erected by the Cairo Short Line Company. The work of removing the charred remains of the old mill will require about two weeks, when immediate steps will be taken to place in its stead the repair shops of the Cairo Short Line. Of the old machinery formerly used at the mill scarcely anything remaining is of any value, except as old scrap iron. So fierce was the fire that about everything was utterly destroyed.

It is reported that Messrs. Cogan & Sen propose to start up a cutlery works in Joliet, whose specialty will be the manufacture of fine pocket cutlery, as soon as the necessary buildings can be erected.

Five hundred workmen have commenced operations at South Chicago on the new steel mills for the North Chicago Rolling Mill Company.

INDIANA.

It is said that the Nelson iron furnace at Shoals, which has been idle the past three years, has recently been leased by a company of practical iron manufacturers, who will soon start it up and drive it to its full capacity hereafter. Near the furnace is a bank of native iron ore 42 feet thick.

Special Notices.

COMMISSIONER'S SALE.

J. H. HILLMAN,
THOS. T. HILLMAN, and
GEO. S. WHARTON,
Commissioners for
DANIEL HILLMAN.

Plaintiffs
on
ex parte petition.

By virtue of a judgment rendered in the above-named cause, at the February term, 1880, of the Trigg Circuit Court (for the settlement of partnership), I will, on MONDAY, the 10th day of May, 1880 (being County Court day), at the front door of the Court House in Cadiz, Ky., sell to the highest bidder the Tennessee Rolling Mill and lands attached, situated on the Cumberland River, in Lyon County, Ky., and 10 miles from Eddyville and Elizabethtown and Paducah Railroad. The mill consists of the following machinery: one Plate Mill, 56 x 26; two High Rolls, driven by 2 x 30 Engine; one Steam Hammer, 100 tons, 4 ton and 4 foot stroke; one Plate and Sheet Mill, 76 x 22; one 16-inch Bar Mill, train complete; one 9-inch Bar and Rod Mill; one 8-inch Bar and Hoop Mill; nine Puddling Furnaces; thirteen Knobling Piles; fifteen rollers; twelve Engines, large and small; Muck Train, Burden Squeezer, &c.; one Run out Fire; seven Heating Furnaces; two Annealing Furnaces; seven pair Shears; one Steam Saw; one Testing Machine; Railroad Tracks and Scales; full sets of all tools needed; Storehouse, Office, Warehouse, Dwelling and many workmen's houses, with about 150 acres of land, about 600 acres of which are a cultivation.

I will also, at the same time and place, sell the Trigg Furnace, situated about three miles from the Cumberland River and four miles from said mill, in Trigg County, Ky. Said furnace is first class; built in 1872; Charcoal Furnace, 40 feet high, 12 feet bore; sixty-pipe Davis Hot Blast; four Boilers; Horizontal Engine, 6 feet stroke, 20 inch diameter; furnace arranged for Cold or Hot Blast, and makes first-class iron; Storehouse, Office, Dwelling, and all necessary workmen's houses, &c., and about 400 acres of land, with about 400 acres in cultivation.

This property will be sold on the following terms: If Rolling Mill and lands are sold together, a credit of one, two, three and four years will be given. Trigg Furnace and lands on same terms. If the machinery should be sold separate from the lands, the terms for it will be one-third cash, balance in six and twelve months. The purchaser will be required to execute bonds for the purchase money, payable to the Commissioner in the nature of a receipt for the purchase money.

J. H. Hillman, at Tennessee Rolling Mill, will take pleasure in showing the property to any one desiring to look at same.

CADIZ, KY., March 4, 1880.

THOMAS H. GRINTER,
Special Commissioner.

Second-Hand and New Machinists' Tools.

We will be ready to deliver latter part of March:

Six Engine Lathes, 16 in. x 7 ft.

Six " " 16 in. x 8 ft.

Made by Ames Mfg. Co.

One 25 in. x 48 in. Corliss Engine.

One Engine Lathe, 20 in. x 20 ft. Ames, new

One " " 72 in. x 20 ft., good as new.

One " " 37 in. x 24 ft. Pond, nearly new.

One " " 30 in. x 20 ft., good order.

One " " 30 in. x 16 ft. Wheeler, new.

One " " 26 in. x 14 ft. Wheeler, new.

One " " 20 in. x 12 ft. Heavy, fair order.

Five " " 20 in. x 10 ft. Lincoln, new.

One " " 18 in. x 6 ft. Lathe & Morse.

One Chucking Lathe 26 in. x 8 in. x 8 ft. Lathe & Morse.

One Hand Lathe, 20 in. x 8 ft. Wheeler.

Two " " 20 in. x 10 ft.

Six " " 11 in. x 4 1/2 ft. Spencer, New.

Four " " 7 in. x 2 1/2 ft. " "

One Planer, 22 in. x 4 ft. Wheeler, A. 1.

One " " 27 in. x 6 ft. Niles, new.

One No. 3, Garvin Miller, new.

Two Lincoln Pattern Milling Machines.

Two 24 in. Upright Drills, self feed, Ames, new.

One 24 in. " " Pratt & Whitney, A. 1.

One 10 in. " " Perkins, New.

One 10 in. " " Blaisdell.

One each P & W. No. 2, 2 sp. No. 1, 3 sp. No. 2, 4 spindle

Three Sensitive Drills, drills to 3/16 in. hole.

One each No. 1 & 4. Wilder Punch Press, Geared, new.

One each No. 6, Wilder Punch & Shear Geared, new.

One each No. 1 & 3. Wilder Bar Iron Cutter, new.

One Pratt & Whitney Profiling Machine, nearly new.

One 10 H. P. Baxter Engine.

Six Stephens Vices, 3/4 in.

Belt, Shafting and Miscellaneous Machinery.

E. P. BULLARD, 14 Dey st., New York.

JENNINGS' DISCOUNT TABLES.

(2 x 8 to 8 x 8) and all the combinations.

We find them correct and wonderfully "labor saving."

Counting House Edition (former price \$3), size 6 1/2 x 11

in. weight, 14 pounds, Cloth Bound, Large Type, \$2.00.

Pocket Edition, size about 4 1/2 inches, Cloth Bound,

Small Type, \$1.00.

Pocket Edition, Paper Covers, 75 cents.

Parties ordering the Pocket Editions will have the

privilege of exchanging for Counting House Edition

if they should desire it. Currency may be sent by

mail at Publisher's risk. Address: J. J. JENNINGS,

Deep River, Conn.

For Sale at a Bargain.

Factory property in Naugatuck, Conn.,

with water power; completely equipped for

the manufacture of Cutlery, Shears, or

other light metal goods. Thorough invest-

igation invited. Apply to

TUTTLE & WHITTEMORE,

NAUGATUCK, CONN.

Bissell & Welles,

Wholesale Hardware Auctioneers,

83 Chambers and 65 Reade Sts., N. Y.

Sales held weekly for the trade. Consignments

solicited. We refer to the leading Manufacturers

and importers.

FOR SALE, CHEAP.

A Second-Hand 5-horse-power Portable Engine

and Boiler (Economizer, built by Porter Mfg.

Co., Syracuse, N. Y.; nearly new and in perfect

order. For particulars, call on or address

THE RENZ HARDWARE CO.,

Bridgeport, Conn.

A PRACTICAL MAN, who has had over thirty

years' experience in making Steel in some of

the leading houses in England and America, is

open to an engagement. Good reference. Ad-

dress

J. W. M.

P. O. Box 194, Beaver Falls, Pa.

Special Notices.

A. J. STEINMAN, Chairman. W. B. MIDDLETON, Supt.

W. G. MENDINHAL, Sec'y & Treas.

OFFICE OF

PENN IRON COMPANY, Limited,

MANUFACTURERS OF

Merchant Bar Iron, Hammered and

Rolled Axes, Car Forgings, Bridge

Work, Fish Joints, Bolts, R. R.

Spikes, Bolt Ends, &c., &c.,

LANCASTER, PA.

FOR SALE.

One large Planer, 25 ft. long, 5 ft. square, built very heavy, in first class condition. Also, Shafting and Pulleys, and one large Cupola and one large Foundry Crane, all in good condition and for sale cheap. Address

PENN IRON CO., LIMITED,

Lancaster, Penn.

DON'T BUY

MACHINERY

Of any kind

UNTIL YOU WRITE TO US

for our List No. 20, containing full description, with prices, of over 2000 New and Second-Hand Machines, such as

MACHINE TOOLS,

BLACKSMITH TOOLS,

WOODWORKING MACHINERY,

STATIONARY AND HORIZONTAL

ENGINES AND BOILERS,

PORTABLE ENGINES,

HOISTING ENGINES,

CAR MACHINERY,

WATER WHEELS,

COTTON AND

WOOLEN MACHINERY,

SAWS,

STEAM PUMPS, &c., &c.

We offer the largest collection ever in the hands of ONE FIRM before, and at

PRICES FAR BELOW THEIR TRUE VALUE.

Enclose stamp and state fully just what Machine or Machines you are in want of. Address

S. C. FORSAITH & CO.,

MACHINISTS,

AND GENERAL MACHINE DEALERS,

MANCHESTER, N. H.

1880.] EIGHTH [1880.

CINCINNATI

INDUSTRIAL

EXPOSITION.

THE EIGHTH EXHIBITION OF

Art and Industry

Will open September 8,

and close October 9, 1880,

IN THE

GRAND PERMANENT BUILDINGS.

ITS REPUTATION IS NATIONAL.

Exhibitors from 24 States Last Year.

Its honorable record is world wide, and its man-

agement is guaranteed by a popular public sub-

scription, and is held under the joint auspices of the

Chamber of Commerce, Board of Trade and Ohio

Mechanics' Institute, who have so

satisfactorily conducted these Expositions since

1870.

No Stockholders! No Dividends!

No Private Interests to Subserve!

No Charge for Space or Steam Power!

Full Premium Lists will be ready May 1.

HUGH McCOLLUM, Secretary.

JOHN R. WHITLEY & CO.,

European Representatives of First-

Class American Houses,

WITH

FIRST-CLASS AGENTS

IN THE

Principal Industrial and Agricultural

Cities and Centers of Europe.

TERMS ON APPLICATION.

LONDON, PARIS,

7 Poultry, E. C. 8 Place Vendome.

Hardware Business.

I propose to sell my stock of Hardware, com-

prising a full line of General Hardware, Agricul-

tural Implements, Field and Garden Seed, House-

hold Goods, &c., &c., situated within thirty

miles of New York, centrally located in a town of

4500 inhabitants, supported by a well populated

and rich surrounding country. No competition;

a business of \$25,000 annually, largely cash. I

sell for no other reason than ill health. Address

HARDWARE, Box 55,

Office of The Iron Age, 83 Reade St., New York.

For Sale.

Stock of Hardware, Stoves, Implements, Tin-

ners' Tools and Stock, in South Western Iowa.

Address

Y,

Office of The Iron Age, 83 Reade St., New York

By an established Foundry and Machine Shop,

any kind of work in Wrought or Cast Iron. Will

undertake to fill orders in the best manner and on

reasonable terms. Address

BOY 204,

West Chester, Pa.

Special Notices.

SECOND-HAND

and NEW TOOLS

FOR SALE LOW.

April List No. 1.

Miscellaneous Second-Hand Tools.

All in Good Order, and will be sold very low

One Engine Lathe, 23 in. x 21 ft.

One Engine Lathe, 18 in. x 10 ft.

Three Speed Lathes, 4 ft.

One Smith & Garvin Milling Machine.

One Engine Lathe, 24 in. swing x 12 ft. bed.

One Engine Lathe, 28 in. swing x 14 ft. bed.

Seven Engine Lathes, 18 in. swing x 7 1/2 ft. bed.

(Chain-feed Lathes.)

One Horizontal Boring Lathe.

Two Wood-Turning Lathes.

One Bement Double-Pulley Lathe.

One Planer, 38 in. x 10 ft.

One Planer, 24 in. x 7 ft.

One Planer, 30 in. x 7 ft. chuck, &c.

One Planer, 72 in. x 66 in. x 24 ft.

Two Planers, 22 in. x 5 ft.

One Four-Spindle Drill.

Three Bolt Cutters, various sizes.

One No. 2 Bolt Cutter.

One new "Hardaway" Bolt Heading Machine,

to head up to 7/8-in. bolts.

One new "Hardaway" Bolt Heading Machine,

to head up to 1 1/2-in. bolts.

A lot of Wood Working Machinery.

One Engine Lathe, 24 in. swing x 12 ft. bed.

Two Profiling Machines, Two Spindle.

One Hydraulic Car Wheel Press.

One Large Punching Press.

Five Medium Punching Presses.

Six Small Punching Presses.

One N. Y. Steam Engine Co. Roll Cutter, 1/2 in.

to 1 1/4 in.

One N. Y. Safety Steam Power Co. Upright.

15 H. P. Engine, and 20 H. P. Upright Boiler

with all connections, &c.

NEW TOOLS, Very Low.

Five No. 2 Bolt Cutters, Wood & Light.

One No. 1 Bolt Cutter, with center, Wood &

Light.

Three No. 2 Bolt Cutters, with center, Wood &

Light.

One Engine Lathe, 26 in. swing, x 16 ft. bed.

One Planer, 30 in. x 4 ft.

One 26 in. swing Upright Drill, not back geared.

Two 26 in. swing back geared and self-feed Up-

right Drills.

One 15-inch Shaping Machine.

Please specify which of the above tools you want

and we will forward all particulars.

STEAM LAUNCH.

40 ft. x 7 ft. 11 ft. Engine, 5 1/2 x 9;

Boilers 12 x 48. Fitted with carpets, &c., for

pleasure.

A Woodruff &

to the trade at \$63 per dozen, net. These machines are illustrated in advertisement on the 20th page, to which we invite attention.

The following explains itself:

WILLIAMSPORT, PA., March 30, 1880.
To the Trade.—We have made arrangements with Messrs. Graham & Haines, of No. 113 Chambers street, New York, to represent us as our agents. They will be enabled at all times to sell our Flint, Sand and Emery Papers and Emery Cloth at our lowest and best factory prices and terms. We propose carrying with them sufficient stock to supply all wants immediately required.

Respectfully,
J. BARTLES & Co.
We call attention to the advertisement of Q. S. Backus, on page 16, descriptive of an entire new line of "Bit Braces, &c.", which he is now prepared to place upon the market.

We have received the following notice of dissolution of partnership. The advertisement of the new firm appears on the 4th page, to which we invite attention:

The partnership heretofore existing between the undersigned, under the firm name of Kirkpatrick, Beale & Co., is this day dissolved by mutual consent, Joseph G. Beale retiring from the business, which will be continued by the remaining partners under the firm name of Kirkpatrick & Co., who will pay all claims and collect all accounts due the late firm.

JNO. C. KIRKPATRICK,
JOS. G. BEALE.
JNO. C. WALLACE.
PITTSBURGH, March 24, 1880.

In retiring from the firm of Kirkpatrick, Beale & Co., I cheerfully recommend my former partners to our friends, soliciting for them a continuance of their good will and patronage.

JOS. G. BEALE.
In continuing the business of the late firm, we desire to offer acknowledgments for the liberal patronage bestowed upon us in the past, and to assure our friends that no efforts will be spared in the future in trying to meet their wants and merit a continuance of their trade.

KIRKPATRICK & Co.
Attention is called to the advertisement on page 32 of Barbed Fence Wire, manufactured by the Lyman Mfg. Co., for which great excellence is claimed. W. K. Ross, 95 Chambers street, is the agent.

We invite attention to the advertisement of Burditt & Williams, of Boston, Mass., which appears among "Special Notices," on Page 26.

BRITISH IRON MARKET.

[Special Report by Cable to The Iron Age.]

LONDON, Wednesday, March 31, 1880.

Scotch Pig.—The downward movement in prices still continues and there is very little business doing. Since last Wednesday the price of Gartsherrie has declined 3/6, Coltness and Glengarnock each 2/ and Eglinton 1/4. The following are to-day's quotations:

Gartsherrie.....64/6
Coltness.....66/6
Glengarnock.....64/6
Eglinton.....60/6

Manufactured Iron.—There is but little business and prices are weak. We continue our quotation of Best Staffordshire Bars at 49.

Steel Rails.—The market is quiet. We quote, nominally, for ordinary sections, 49 5/2 @ £10.

Iron Rails.—The demand is small and business light. We quote Welsh, nominally, £8 10/ @ £8 15/.

Old Rails.—The offerings are moderate and sales fair. Prices are weak. We quote Ts, £6 5/—a decline of 5/ since last Wednesday.

Scrap.—The offerings are fair and business light. Prices are weak at £5 2/6 for Wrought.

IRON.

American Pig.—The general condition of the iron market is unchanged since our last writing, and it may fairly be stated that it is extremely dull and spiritless. Sales are reported, on private terms, of 1000 tons No. 1 X, a Lehigh brand, and 400 tons No. 1 North River iron, the latter said to be at full figures. A rumor, the truth of which we cannot vouch for, comes to us from Pittsburgh to the effect that the Iron Workers' Association will refuse to work foreign iron, either in the raw or more finished state. We quote, nominally, Foundry No. 1, \$38; Foundry No. 2 X, \$37; Gray Forge, \$33 @ \$35.

Scotch Pig.—Some importers of Scotch Iron report a better inquiry to-day than has been the case for some time, while others fail to recognize any improvement, and say that the market is as dull as it is possible to be at this season. We hear of sales of 500 tons Glengarnock in lots, 100 tons Carnbroe and 100 tons Eglinton, all on terms which have not been reported. The following are to-day's quotations: Eglinton, \$28.75 @ \$29.50; Glengarnock, \$28.50 @ \$30; Gartsherrie, \$29 @ \$30, and Coltness, \$33.

Rails.—No transactions are reported during the week, and we quote, nominally, Steel, \$76 @ \$80, and Iron, \$60 @ \$65.

Old Rails.—The market remains quiet, although an improved inquiry is reported. Some spot lots have been offered within a few days at \$35, but \$30 @ \$40 is now asked. We quote \$38 @ \$39 for Ts, and note sales of 3500 tons on private terms.

Scrap.—We hear of sales in lots, on the

spot and to arrive, amounting to 1000 tons, on private terms; also 600 tons, to arrive, at \$37. We quote No. 1 Wrought, from yard, \$40.

Manufactured Iron.—The demand for Manufactured Iron is light, and prices are weak and in buyers' favor. The amount of foreign Bar Iron in this market is steadily increasing, and there is a good deal of effort to sell on the part of some holders. The number of foreign Bars arrived at this port for the week ending 30th inst., was 83,720, and of Bar Iron, bundles, 246. The city trade have not changed their card since the adoption of the 4¢ rate, but this figure is practically obsolete, and 3.8¢ is the general asking price, while, for a large order, better figures would be named.

METALS.

Copper.—There has been more doing, owing to the deliveries at the end of the month and the giving way of weak holders, some 500,000 lb Lake Superior changing hands at from 22 1/2¢ down to 22¢, and finally recovering to 22 1/4¢, being held at the close at 22 1/4¢. The momentary stagnation in the Copper trade is a natural reaction from the excited state of the market some time since; but the position of the Copper trade on this side is looked upon as being, if anything, rather a sound and favorable one. It is, therefore, believed that the stagnation will be of short duration. The consumption of Copper in this country has, indeed, been an extraordinarily large one during the past 12 months. In 1879 we exported 13,500,000 lb of Lake Superior Copper, 6,500,000 lb of which were furnished from the stock left from 1878. The amount contributed from the product of 1879, therefore, consisted of 7,000,000 lb. only. Of this amount we reimported from Europe 4,000,000 lb. Hence, the actual net import was restricted to 3,000,000 lb. During the last winter season, 1879-80, there were shipped overland from Lake Superior 8,000,000 to 9,000,000 lb of Copper, against about 5,000,000 lb during the corresponding season of 1878-79. In spite of these increased winter shipments the stocks are now quite moderate, for there is estimated to be left at the Lake Superior mines the product of one or, at the most, two months, while the stock here and at Detroit, little of which remains in first hands, is valued at something like 5,000,000 to 6,000,000 lb, and the amount held by manufacturers at 2,000,000 to 3,000,000 lb, making an aggregate of available Copper of about 8,000,000 lb, equal to a two months' consumption if we take last year's absorption for a basis of our estimate. There is, consequently, little fear of our production outrunning current consumption, unless the latter experiences a severe check by our falling back into a protracted dull period, similar to the one from which we emerged last fall. Whether such a relapse into stagnation in general business, and in the Copper trade in particular, is probable or possible it would be idle to attempt forming any opinion about at this early stage. London is a little better, cabling, as it does, Chili Bars, £67, and Best Selected, £76. From the West Coast we hear that Chili has resumed active war operations on shore with success. There has been no change in the manufactures of Copper here since our last report. We quote: Braziers' Copper, 34¢; Bolts, 34¢; Circles, 37¢, and Sheathing Copper, 32¢.

Tin.—The bi-monthly sale of 23,300 slabs Banca and Billiton has come off in Holland to-day, but the result has not been cabled at this writing. Our own market has ruled a trifle firmer, rallying from 20 1/2¢ for Straits Tin, efforts being made by some speculators to advance the price, but besides the ordinary jobbing sales, no large transactions have transpired, and we quote at the close large lines Straits, 21¢; English Refined, 20 1/2¢ @ 20 1/4¢; ditto Common, 20 1/4¢ @ 20 1/2¢; Australian, 20 1/4¢; Billiton, 20 1/4¢ @ 20 1/2¢, and Banca, 23¢ @ 25¢. The Singapore market, the cable tells us, has a downward tendency, having dropped according to yesterday's dispatch to \$28 per picul, against \$30 a fortnight since. There have been daily and violent fluctuations at London, the extremes being £84 and £87 for Straits Tin. The arrivals in this city and Boston during the month just drawing to a close have been very large, say 18,000 slabs Straits, 12,363 slabs Billiton, and 7740 Ingots Australian and some lots of English, footing up to about 1700 tons. A similar quantity may be expected in April. Tin Plates have been very quiet, both consumers and dealers holding off. The consequence has been a decline here. England follows, but the cable informs us that prices there keep about a shilling per box higher. They quote Coke Tins, 22¢. We quote here large lots, ordinary brands, per box: Charcoal Bright, \$9.25 @ \$9.50; ditto Ternes, \$8.25 @ \$8.50; Coke Tins, \$6.75 @ \$7, and ditto Ternes, \$7.25 @ \$7.50.

Lead.—The advices received from abroad by mail are more encouraging. Holders here are firmer. Of Common Domestic some 200 tons sold at 5.65¢ @ 5.75¢, and toward the close, 5.70¢ @ 5.85¢ is asked. Western corrodors are holding off, but refined is also firmer here, although inactive, the asking price at the close being 6 1/4¢. Manufactures of Lead remain unchanged. We quote: Sheet Lead, 9¢; Pipe, 8 1/2¢; Tin-lined Lead Pipe, 15¢, and Block Tin Pipe, 45¢, less the usual discount to dealers.

Spelter and Zinc.—Domestic Spelter has ruled quiet at 6 1/4¢ @ 7¢, and Silesian is inactive at 6 1/2¢ @ 6 3/4¢. Sheet Zinc is worth 19 1/2¢.

Nickel.—Under a steady demand this metal has improved slightly, and prime American now sells at \$1.50.

Antimony.—Accounts from England are favorable to holders, the probability being that they will run short over there all the year round. Of Cookson, this market is devoid of stock, while both Hallett and Johnson are in fair supply. We quote the former, nominally, 24¢, and the latter two, 19 1/2¢.

OLD METALS, PAPER STOCK, &c.

There is not much business being done in Old Metals this week. The market is dull, and we note a decline in the price of Iron and Copper. The Rag and Paper Stock market has still further weakened since our last writing, although we can record no actual change in prices.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy.....	per D. \$	19	@	20
Copper Bottoms.....	"	16	@	17 1/2
Yellow Metal.....	"	11	@	12
Brass, heavy.....	"	13	@	14
Brass, light.....	"	10	@	11
Composition, heavy.....	"	16	@	17
Lead, heavy.....	"	04 1/2	@	05
Tea Lead.....	"	04 1/2	@	05
Zinc.....	"	04 1/2	@	05
Pewter, No. 1.....	"	12	@	13
Pewter, No. 2.....	"	07	@	08
Wrought Iron.....	per ton	35.50	@	36.00
Light do.....	"	20.00	@	20.50
Stove Plate.....	"	15.00	@	15.50
Machinery do.....	"	22.50	@	23.00
Grate Bars.....	"	10.00	@	10.50

The prices current for Rags, &c., are as follows:

Canvas, Linen.....	per D. 1/2 c.	4 1/2	@	5
White Cotton, New.....	"	4 1/2	@	5
White, No. 1.....	"	3 1/2	@	4
White, No. 2.....	"	2 1/2	@	3
Seconds.....	"	1 1/2	@	2
Soft, Woollens.....	"	15	@	16
Mixed Rags.....	"	4	@	5
Gunny bagging.....	"	4	@	5
Jute butts.....	"	2 1/2	@	3
Kentucky bagging.....	"	2	@	3
Newspapers.....	"	2 1/2	@	3
Waste Paper and Scraps.....	"	1	@	2
Kentucky Bale Rope.....	"	4	@	5

EXPORTS.

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending March 30, 1880:

Christiania and.	Quan. Val.	Barcelona.
Pet., gals. 188,920	\$15,344	
Elsinore.		
Ptlin., gals. 145,150	17,200	

Hamburg.	Quan. Val.	Canary Islands.
Ag. imp. pags. 171	2,374	
Mach. pags. 117	1,854	
Gas fixtures, cs.	4	45
Sew. ma., cs.	1	75
Telephones, cs.	10	2,420
Pumps, pags.	5	1,880
Belting, cs.	5	1,880
Ptlin., gals. 28,500	3,379	
Hdw., pags. 147	4,045	
Mach. pags. 43	1,045	
Lub. oil, bbls.	206	2,865
Sil. ore, bags.	123	3,200
Clocks, cs.	63	801
Prte mls, pgs.	32	1,665
Ptldware, cs.	2	71

Bremen.	Quan. Val.	Mexico.
Ptlin., gals. 137,781	81,670	
Lub. oil, bbls.	210	1,480
Mach. pags. 117	1,854	
Ag. imp. pags. 383	6,928	
Sew. ma., cs.	20	1,250
Ptld. ware, cs.	2	79
Belting, bale.	1	90
Pumps, pags.	7	1,590

Dutch West Indies.	Quan. Val.	Cuba.
Nails, kegs.....	2	13
Hdw., pags.....	18	336
Tinware, bxs.....	5	91
Ptld. ware, cs.....	2	79
Belting, bale.....	1	90
Pumps, pags.....	7	1,590

Dutch East Indies.	Quan. Val.	Genoa.
Ptlin., gals. 297,000	35,748	
Ag. imp. pags. 4	310	
I. rolls, cs.....	4	490
Sew. ma., cs.....	20	1,250
Pumps, pags.....	7	1,590
Guns, cs.....	20	5,300
Hdw., pags.....	16	1,300
Iron, tons.....	21	700
Mf. iron, pags.....	10	98

Hull.	Quan. Val.	United States of Colombia.
Ag. imp. pgs. 63	4,361	
S. rollers, cs.....	2	80
Mf. iron, pags.....	4	125
Hdw., pags.....	20	1,115
W. mls, pags.....	25	2,102
Iron pipes.....	20	3,900

Bristol.	Quan. Val.	Venezuela.
Clocks, bxs.....	13	370
Cette.		
Ptlin., gals. 177,027	8,140	

Liverpool.	Quan. Val.	Brasil.
Mach'y, cs.....	54	8,065
Tin mls, pgs.....	35	2,900
Pumps, pags.....	3	425
Guns, cs.....	20	5,300
Hdw., pags.....	16	1,300
Iron, tons.....	21	700
Mf. iron, pags.....	10	98

British North American Colonies.	Quan. Val.	London.
Coal, tons.....	290	1,133
Hdw., cs.....	21	142
Ptlin., gals. 2,047	357	
Glassware, cs.	131	565
Powder, lbs.....	500	760

British West Indies.	Quan. Val.	Glasgow.
Ptlin., gals. 26,950	3,024	
Nails, kegs.....	38	346
Hdw., cs.....	10	206
S. w. app. pgs.....	3	253
Ptldware, cs.....	2	149
Carriages, cs.....	2	425
Glassware, cs.....	12	260

British Guiana.	Quan. Val.	Argentina Republic.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Valencia.	Quan. Val.	China.
Ptlin., gals. 8,615	9,100	
Ag. imp. pags. 108	30,735	

Haere.	Quan. Val.	French West Indies.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

French West Indies.	Quan. Val.	COAL.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

COAL.	Quan. Val.	Imports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Imports.	Quan. Val.	Exports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Exports.	Quan. Val.	Imports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Imports.	Quan. Val.	Exports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Exports.	Quan. Val.	Imports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Imports.	Quan. Val.	Exports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Exports.	Quan. Val.	Imports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Imports.	Quan. Val.	Exports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

Exports.	Quan. Val.	Imports.
Ptlin., gals. 13,000	1,492	
Cars.....	2	1,150
Glassware, cs.	8	69

IMPORTS.
Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending March 30, 1880:

Hardware.	Quan. Val.	Imports.
Baring Bros. & Co.		
Fig. tons, 82		
Pierson & Co.		
Bars, 17,436		
T-iron, bars, 478		
Seligmann, J. & W. & Co.		
Rods, lots, 763		
Strout W. L.		
Bundles, 729		
Wall P. I.		
Rods, bbls., 1000		
Williamson Jas. & Co.		
Fig. tons, 600		
Order.		
Band iron, bds., 1113		
Bar iron, bbls., 246		
Bars, 55,866		
Barrels, 15		
Bundles, 1284		
Cast iron, cs., 522		
Flat iron, bars, 710		
Gal. iron, cs., 25		
Hoop iron, bds., 8412		
Lots, 2		
Old iron fish plates, pcs., 13,098		
Old iron, lbs., 19,010		
Old rails, tons, 1754		
Ore, cs., 300		
Pig, tons, 2262		
Rail, 1		
Round iron, bars, 256		
Scrap, tons, 700		
Sheet iron, bbls., 1476		
Sheets, 18		

McCoy & Co. Hdw., cks., 3 Meyer, G. A. & E. Coal, tons, 410 Milliken & Smith, Wire blds., 2451	Metals. Baring Bros. & Co. Tin, slabs, 1091 Tin plates, bxs., 937 Barthold R. R.
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are, for the moment, among the most absorbing topics of conversation among commercial men, notwithstanding the existence of other more or less exciting themes. In not a few well-informed quarters there is an expression of a steady belief in the continuance of the revival, marred although it may be by sundry temporary checks. The present quietude does not seem to exert any particularly noticeable influence upon those who hold this cheerful view. They state that the relapse is perfectly legitimate and natural, as being the necessary outcome of the enormous and abnormal inflation and speculation of the past few months. The speculators having at length been frightened by the "differences" for which they have become liable, have come "with a rush" in order to realize. That end, however, they have not been universally enabled to attain, inasmuch as others of their kind happen to have interests in the opposite direction, besides those long-headed men of business who "know their way about" much too thoroughly to buy in until, by holding back, they have beaten down prices to the utmost limit. This done they have at length begun to repurchase, and the Glasgow market, for instance, is again displaying symptoms of a revival. All these points are counted as being in their favor by the optimists, who, although not the most numerous, are certainly the best informed and most experienced members of the iron trade section of the community. On the other hand, we have quite a consensus of opinion in support of the pessimistic idea. We are told that everything points to a relapse still greater and more prolonged than that which has already been felt. Your market is, of course, a strong card to play in this direction, and current cable reports from New York are cited in proof of the death of the "boom," and the fact that your extraordinary period of prosperity has had its brief day, and exists no longer. It is, of course, useless to argue this point on any given lines, seeing that the only advice we possess at present are brief items by telegraph, and we have no data either to determine the possible duration of the collapse or its active cause. Other evidence of a pessimistic nature is also being brought forward, such as the weakness of the home German, French and Belgian markets, and the occurrence of the general election. These facts, too, cannot be overlooked by an impartial observer of the situation, but it seems to me that it is possible to take too gloomy a view and to derive inferences which the premises will not fully carry. I have gone over the ground so amply in some of my recent letters that I do not feel justified in again attempting to thrash out the already beaten straw, but I must once more express my personal opinion in favor of the impression that it is likely, rather than otherwise, that the lull will prove temporary, and that so soon as certain causes, now operating as deterrents against further progress, shall have been removed or exhausted, we are not unlikely to witness another upward movement. There are sundry statistical pieces of evidence in favor of this idea, and I think those whose patience will carry them over the next month or so will probably be rewarded at the end of that period. Much may depend upon the course of your market, which un-

doubtfully influences our own, although there is a strong reflex current from this side. In the absence of details from the United States it is practically impossible to calculate which of the two markets is the more dependent upon the other. There is an impression here, however, that some of the weakness of your iron market has arisen from the favorable manner in which the quotations of importers have compared with those of your native producers. The lowness of our prices will, no doubt, have diverted a good deal of business into the hands of British agents, and it is inferred that your producers, having witnessed this novel diversion of traffic into old-time channels, may have resolved to cut prices as to recover their lost ground, and possibly drive their competitors out of the field. This may be guess work, but it is part and parcel of the situation, and as such I give it place here. Had our market continued to "boom" and go up it is supposed that there would have been no downward movement with you, but your manufacturers, feeling complete "masters of the ship," would have been under no obligation whatever to lower their rates. I may just add that in Staffordshire there is renewed talk of a further possible advance to the extent of 10/ or 11 per ton in the price of marked bars at quarterday, owing to the operation of the new wages scale, which prior to that date will probably give the ironworkers higher rates of remuneration, based upon the selling prices of finished iron during the (now) present quarter. This line of reasoning may or may not be well founded, but so far as I can see there is no sound basis whatever for supposing that the state of trade will warrant any new impositions in the matter of prices. At £2 marked bars are now sufficiently slow of sale to give many producers cause for anxiety, especially when it is seen that unmarked iron is rapidly deteriorating in price, and is obtainable on terms which are 20/ or more in buyer's favor than those of a month or six weeks since. The production of bars is probably above the consumptive requirements of the home market, and the export mania is receiving a check which will tend to make the oversupply still more considerable. Second holders in almost all lines of iron, steel, tin plates, &c., command most of the actual business of the day, so that until their unloading process shall have been completed, producers are unlikely to do more than maintain their nominal quotations and do the best they can under the circumstances. Advances appear to be out of the question, notwithstanding all that is said and published to the contrary by persons directly or indirectly interested in the result.

THE GENERAL ELECTION

has come about rather sooner than had been anticipated would be the case, and we are consequently somewhat hurriedly plunged into the throes of a contest which promises to be one of the most hotly fought of modern times. Fortunately the struggle, although sharp, will be short. The present Parliament will die on March 23d, and the writs for the new one will be issued either on the 24th or 25th. Counting Good Friday as a *dies non*, the writs will be legally returnable by the 20th, so that there is the chance that the first of the elections may take place during the last two days of March. These primary votes will probably be in some of the Metropolitan constituencies. The whole of the elections are not held on one day, as you may know, but are spread over three or four weeks—chiefly within the fortnight following the issuing of the writs. It is thus pretty plain that the whole of the new members will have been selected before the end of April, so that the reconstituted House of Commons may meet early in May and legislation go on as usual until August, when the prorogation generally takes place. The Ministers rely upon being returned with a good working majority, say of 40 to 60, and it is commonly agreed that the Liberals have scarcely the ghost of a chance of regaining place and power. In Scotland they will probably gain a few seats, but in England the electors seem certain to go against them. In Ireland the Home Rulers count upon having a total of 70 members, with which formidable number they would in reality constitute a floating balance, sufficient to upset either of the two great parties to which they happened to be opposed. The government to be thoroughly successful must, therefore, secure a majority over both the Liberals proper and the Home Rulers combined. For this Lord Beaconsfield has already made a very high bid, no doubt relying upon the examples furnished by the recent bye elections at Liverpool, Southwark, &c. It is, perhaps, a fortunate thing for us as a trading nation that there are no fiscal questions involved in the issues put before the nation. Whether the one party or the other is intrusted with the reins of government, none of our present commercial principles will be disturbed. Both are alike committed to the maintenance of free trade, and both are equally bound by our other established financial, &c., rules. Some of the trading societies are endeavoring to make the co-operative stores question a test point for the candidates, and the government have avowedly declared their intention of bringing the civil-service stores within the range of the income tax; but, on the whole, this is obviously a side wind and will not largely affect the voting. Until the elections are over, business of all kinds is certain to be much interfered with.

SCOTCH PIG IRON

has been weak and irregular since my last report, with a considerable fall in prices all round. Warrants have come down very much, but makers' brands have descended even lower still, and at the time of this writing are very uncertain. The production has been further increased by the blowing in of another furnace, making the present total 114, compared with 90 at the same date of last year. On the other hand, the reserve stock is decreasing, having fallen off to the extent of 450 tons during the week, leaving the quantity now held by Connal & Co., 443,397 tons, against 225,830 tons a year ago. Should this decreased storage continue, the circumstance would appear to be likely to enhance values, although the decrease may not really result from increased consumption, but merely from a variation of makers' policy in withholding iron from the stores. Ballast pig iron is,

as before, 57/6 @ 60/3 ton. Shipments are on a large scale, and were last week 4000 tons over the same week of 1879. Imports of Middlesex pig into Scotland are small—2664 tons below those of the comparative week. The total to date has increased 6194 tons only. Writing from Glasgow on March 12, James Watson & Co. said: "We have to report continued depression in our Scotch pig iron market during the past week, shipping parcels participating to an even greater extent than the warranted quotations. On Monday the warrant market opened at 59/3, cash, and receded to 58/3, rallying to 59/1 on Tuesday we opened depressed at 58/9, and 58/1, but, on the strength of considerable buying orders, price advanced rapidly from that to 61/8, cash. Wednesday's market opened at 61/6, cash, fell to 60/1, advancing to 60/10/12, but closing quieter at 60/6. Yesterday business was done 59/7 @ 58/6, cash, closing at 59/1 1/2. To-day the price has fluctuated between 59/5, 59/9 and 59/1 1/2, closing buyers at 59/1; sellers, 59/3. The shipments last week were 17,032 tons, as compared with 13,910 tons for the corresponding week of 1879." We quote:

G. M. B. at Glasgow	No. 1.	No. 3.
Gartsherrie	63/	59/6
Coltness	74/	66/
Summerlee	70/6	61/6
Langloan	72/	61/6
Carbriar	70/	61/6
Caldar, at Port Dundas	70/6	61/6
Glenamock, at Ardrossan	70/	62/
Eglinton	65/	60/
Dalmellington	65/	60/
Shotts at Leith	70/6	65/

CLEVELAND PIG IRON

is now quoted as under for G. M. B., net cash, f. o. b. in Tees:

No. 1 Foundry	No. 4 Forge
67/6	59/
62/6	58/6
58/	58/
58/	57/6

HEMATITE PIG IRONS

in sympathy with other sorts, are growing weaker, mostly owing to large offerings in second hands at 10/ or more per ton under the quotations of actual producers, whose prices remain fairly steady. For West Cumberland brands the following figures are current:

No. 1.	No. 2.	No. 3.
Cleator	125/	124/
Lonsdale	117/	116/
Lowther	117/	116/
Moss Bay	117/	116/
Harrington	117/	116/
Solway	117/	116/
Maryport	116/	115/
Askam	115/	114/

These are 1/ or 2/ more at certain ports other than those from which each brand is usually shipped. K. H. hematite (Kirkless Hall) is £6. 10/; K. H. Messelonn (Wigan Coal and Iron Company), £7; and Hornaby (Stockton) hematite, £6. 5/ for No. 1, and £6 for Nos. 3, 4 and 5. Some of the sales of hematite effected within the past week or ten days are said to have been based upon figures very like, if anything, in excess of £5 per ton—a price which makes the producers wince, but has not as yet had the effect of bringing down their list prices. The makers will play a waiting game, and hope to win by so doing.

THE RAIL TRADE

of this country scarcely seems so strong as it did when I last had occasion to refer to it at length. I do not now return more briefly to the subject because I have anything of especial moment to communicate, or because any striking change has supervened, but because I am of opinion that the state and prospects of the industry are becoming more "mixed" than those engaged therein, or affected thereby, care to observe. When the year 1880 opened, the steel rail branches had the promise of an unworked "bonanza," of which nobody could foretell the riches, and it was very generally agreed that the future was pregnant with business and profits of an almost incredible nature and extent. In all directions there was a rush for supplies, the eager inquiries of the home railway companies being almost defied, and often outbid by the offers of brokers and agents. There were inquiries of all sorts and sizes in the field, and manufacturers suddenly experiencing the novel sensation of having the whip-hand grew self-reliant, and ran up prices in a manner which they declared was simply due to the instinct of self-preservation, but which unprejudiced onlookers strongly and constantly deprecated as being mere incentives to speculation. From the United States we heard tidings which seemed to justify the expectation that the wants of that country, during 1880, would be so urgent and formidable as to give our rail mills incessant and remunerative employment for the whole of the twelve months. There appeared to be no doubt whatever on this head, the evidence furnished being from sources in the United States universally accounted reliable and trustworthy. As a matter of fact, *The Iron Age* itself spoke of the construction of 7000 to 9000 miles of new roads, and mentioned that much of the permanent way needed would have to be imported. Weighing up these statements, and supported by this concurrent testimony, the British rail makers showed a bold and united front, and in one solid phalanx ran up quotations from £5. 10/ and £6 to £11 and £12 per ton. Then there came a period of doubt, and now there is something very like unto dismay. There is much searching after the American orders, and the general result is either that they are not forthcoming at all, or that they have been placed already.

Some of the roads have bought iron rails in Wales, Monmouthshire, or Belgium, at prices but slightly below steel in cost at the works, but with less duty to pay at your end. In other cases, the orders have been placed with brokers in London, Liverpool, &c., and these gentlemen have bought on the Continent. Thus it is that at this moment rails for America are being rolled at Krupp's, of Essen; at Seraing (Cockerill's); the Union Works, of Dortmund, Westphalia; the Königsbütte and Lanrothütte Works, Germany; Schneider's, of Creusot, and possibly also at Terrenoire and Hayange. What the total tonnage thus entrusted to Continental producers may be I do not venture to guess. It is certain, at all events, that their gain is our loss, and, further, that such loss has been largely contributed to by the high prices declared here. I do not hint that our manufacturers are, or have been, to blame. They know their business much better than any

outsider, but one cannot avoid the reflection that there must have been a lack of foresight somewhere. They know that the merchants and brokers—say, for example, Naylor Benzon, Banks, Fields, &c.—are bound to buy to the best advantage, and that they have no national or patriotic scruples where business is in question. Some of the producers are said to have lost rather than gained by the rises, because they had not been sufficiently sagacious to cover themselves by contracts for raw materials. For that, however, they are alone to blame. The signs of the times were "write large," and they could read as well as their fellows. In any case, that is how the matter stands. The bulk of the American orders have gone elsewhere, or have not been placed at all, while our works seem to be destined to run off the home orders which they secured, on optional terms in point of the periods of delivery. Certain it is that our share of your favors cannot have been large, seeing that of iron and steel rails together, in February, we exported only 12,700 tons—a total which falls very far short of the proportions necessary to make up the hundreds of thousands of tons spoken of a few months ago. At the time of writing there is more modesty among our rail mill owners, and £9, £9.10 and £10 are mentioned in quarters where nothing under £11 or £12 could have been a month or so since. At the same time I doubt whether the Continental prices could be advantageously compared with our own at the moment, seeing that orders for about 150,000 tons are known to have been given out quite recently in France alone, while the German establishments are almost universally amply occupied. So far as your requirements are in question, then, it would seem to be probable that your roads will have to consider what is really necessary and what is optional. Necessities know no law and must be met. If they cannot be met at home they must be negotiated abroad. If sent to Great Britain I have little doubt that the prices of to-day, or a few weeks hence, would be found to bear very favorable comparison with those of the recent past. Our works are well employed, and they will be so for some months ahead, but readers of my former letters will remember that a large proportion of the work has been taken on such terms as leave room for further orders at suitable prices. In the meantime the extensions planned by your Bessemer works are being watched with no slight interest, mingled, perhaps, with a little chagrin, and the progress of the rail tariff bill through your House of Representatives is awaited with no small amount of expectation. Should the reduced tariff become law within the next few months there would certainly be a big rush of rails into the States, in the hope of securing the larger proportion of the orders necessitated by the extension schemes now in *petto* or in progress. It would, however, probably be the "last of the Mohicans," and wind up our exports of rails to your ports.

AT SHEFFIELD

the heavier industries continue fairly busy; in fact at some of the works the amount of employment decidedly comes within that category. This is especially the case at the ironworks proper and the Bessemer establishments. Several of the crucible steel manufacturers are fairly engaged. Messrs. Firth & Son have some good orders for tubes on account of the Woolwich authorities, as well as rifle barrels for the Chinese Government. I am not aware whether Messrs. Firth are again boring these barrels themselves, as was formerly their practice. They have splendid machinery for that purpose. The lighter trades are not generally busy, although there are several of the larger cutlery, file, edge tool, sheep-shear, &c., houses which have plenty of work. Joseph Rodgers & Sons, Harrison Bros. & Howson, Brookes & Crookes, John Wilson, and Geo. Wostenholm & Son are all well occupied. The last named are, I hear, setting on as many men as they can obtain. A discussion has sprung up on the subject of using Bessemer steel for cutlery purposes. A correspondent of the *Ironmonger* asserted that 50 per cent. of the cutlery made in the town was of Bessemer. That assertion has been met with a plump denial, but those who are behind the scenes a little are convinced that although the percentage may have been exaggerated, yet that the statement is unfortunately based on but too much truth.

STAFFORDSHIRE AND BIRMINGHAM

are quiet as regards iron of all kinds. As I have already indicated, list prices remain undisturbed, but there is much underselling in vogue, and second holders rule the roost by quoting 5/ 10/ below producers' rates, especially for unmarked bars, which they offer at all sorts of figures, from £7. 15/ upward. Sheets are in fair request at £10 @ £10. 10/, and hoops at from £9 to £11, the former being in most demand. Australian advices for galvanized and fencing being good, those articles are steady at £19 @ £24 for the former and £13. 5/ @ £19 for the latter, according to gauge, &c. As regards hardware, there is much complaining, few of the better markets being as lively as manufacturers or merchants could wish, especially the home trade, which is still dull, and is certain to be further prejudiced by the electioneering period. Builders' requirements are improving, owing to the very favorable weather, but many season goods hang fire, owing to last year's stocks having remained on the retailers' shelves. Prices are maintained, but in few lines is it thought likely there will be additional advances for the present, unless the metals or iron again go ahead.

FOREIGN.

FRANCE.

(Moniteur des Interests Matériels.)

PARIS, March 14, 1880.—Metals.—Business in general still leaves a great deal to be wished for, the iron branch being about the only one still keeping up a tolerably good run of trade. Copper.—We have been steady here and quote at Paris: Chili Bars, 125.50 francs the 100 kilos; Common ditto, 180; Ingots and Slabs, 122.50; Best Selected English, 195; and pure Cornish Ore, 28. Manganese is unaltered. Tin.—The market bears up well against the English decline. We quote nominally here: Banca, deliverable at Paris and Havre, 242.50 francs; Billiton, Straits and Australia, 242.50; and English, at Havre or Rouen, 247.50. Lead is a little weaker. We quote nominally, at Paris and Havre: French and Spanish,

47 @ 47.50; English, 48; and Belgian and German, 49. Manganese sellers no further change in either Tin or Lead. Spelter remains quiet, but firm. We quote Silesian, at Havre, 57.50; and other good brands, at Havre and Paris, 55.50 @ 57.50. Iron.—This has been the first week out of two months past in which no improvement is announced in the French iron market. This was inevitable and was to be foreseen; it need not alarm. The advance has been, as it is, more rapid and considerable than we were permitted to expect. The general iron situation still remains a sad and gloomy one. At Paris first-class Merchant Iron still commands 47 francs, and Iron for flooring, 28. Large orders are spoken of as impending. Among others, the Northern Railroad Company are in need of 2000 railway cars. The Eastern Railroad is only with a full adjudication. Others of the same kind will be put forward by the government lines. The Jacquelin Steam Launch Co. have given an order for 4 lighters and 4 propellers to the firm of Chevaller-Grenier, of Lyons. There is absolutely no change in the various Iron districts of France. The committee entrusted with the subject of improving navigation in the interior of France, has been examining the government project of a canal from Mont to Paris. The majority of the committee seems to apprehend that in the event of the project embracing this project, it will oppose the digging of the "Grand Northern Canal," which would bring France into communication with Belgium through Antwerp, a canal which, by virtue of its depth and locks, would be superior to all other French canals. The Paris-Lyon-Mediterranean railroad line is transforming some passenger cars, by way of experiment, somewhat on the model of modern sleeping cars, and will soon arrive at a resolution as to what model is to be definitely adopted. Coal.—Prices are settling down by degrees, and in a week or two may have attained some stability so as to be able to judge of the probable future course of values.

BEELGIUM.

(Revue Universelle.)

BRUSSELS, March 14, 1880.—Iron.—The general situation in this country has undergone no notable modification since our last review. The tendency, if anything, is downward, but thus far no great drop has occurred, and people generally do not seem to be at all uneasy about the near future. Those works whose order books are full of course show no great disposition to make any concessions, but those not in such a favorable position of necessity are more yielding in their views. The Tone works will be put up for sale again to-morrow. The Chamber of Representatives, by a vote of 83 against 6, has ratified the Temeuse contract to buy back the Antwerp-Rotterdam Railroad. A royal decree also approves the contract to buy back the Ostende Railway to the French frontier, with a branch from Comines to Warneton. Another decree sanctions the enlargement of the Dam at Antwerp. We mention all this to show how active parliament and the government are in pushing our prosperity in all directions. Coal.—The coal situation has undergone no great change, but prices are weak, and after a while will have reached a level to encourage fresh contracts. Meanwhile rates are nominal, most business being transacted on secret terms.

HOLLAND.

(Koch & Vlierboom.)

ROTTERDAM, March 15, 1880.—Tin.—According to the official statistics the price of Banca at the beginning of each month has been as under:

	1873	1874	1875	1876	1877	1878	1879	1880
Jan. 1.	85 1/2	70	57 1/2	50	45	40 1/2	38 1/2	54 1/2
Feb. 1.	87 1/2	70	56 1/2	50 1/2	43 1/2	40	36 1/2	54 1/2
Mar. 1.	84	50 1/2	43 1/2	40 1/2	40	40	40	55 1/2
Apr. 1.	87	53	51 1/2	50	42 1/2	40	43	...
May 1.	84	57	50 1/2	49	42 1/2	39 1/2	40 1/2	...
June 1.	80	59 1/2	50	45 1/2	42 1/2	39 1/2	39 1/2	...
July 1.	82 1/2	50 1/2	46 1/2	42 1/2	40	39 1/2	39 1/2	...
Aug. 1.	79 1/2	56 1/2	48 1/2	44	41 1/2	39 1/2	38 1/2	...
Sept. 1.	79	57	51	43	40 1/2	37 1/2	41 1/2	...
Oct. 1.	74 1/2	56 1/2	52 1/2	42 1/2	40 1/2	35 1/2	45	...
Nov. 1.	72 1/2	52 1/2	44 1/2	43	40 1/2	37 1/2	38	...
Dec. 1.	69 1/2	58 1/2	44 1/2	41 1/2	39	37	38	...

The market has become very quiet, and Banca is now quoted 44.50, and Billiton, 54.25 guilders the 50 kilos, both nominally. The Dutch Trading Company will sell on March 21, 15,000 slabs of Banca and 5300 slabs Billiton.

GERMANY.

(Borsenhalte.)

HAMBURG, March 13, 1880.—We have received the following about the iron situation at Dortmund: "The quiet feeling in the iron trade has been intensified during the week. There is quite a decline in a good many quarters. The only article not affected is Luxembourg Pig Iron, of which some small lots sold at 87 @ 88 francs, against 85 francs the previous week. The sellers are dealers and speculators who sell their Pig. Merchant and Sheet Iron for what they can obtain, thus still securing a profit, since they bought at the commencement of the revival last year, but now largely underselling producers. They are prompted to sell out by the less favorable news from England and America. Gradually the works are compelled to follow suit in this downward movement. This is a natural reaction from the crazy advance of last fall and winter. It is, of course, impossible to judge at this early stage whether the depression will prove a lasting or temporary one. All we can say is that our works are busy all along, but that they are more amenable to business. Opinions, meanwhile, differ very much among makers; some look into the future with serious concern, while others are believers in an ulterior recovery, and secure Pig Iron ahead as much as possible. Some purchases are being made of it in Austria, a country from where this district never before procured it. Puddle pig has from 120 marks receded to 105 @ 105 1/2. Bar iron from 220 to 200 @ 205, and Boiler sheets have dropped from 285 to 270 @ 275. Coal is also tending downward; on April 1 the new contracts will begin to be made, and we shall then be able to form some judgment with respect to the probable course of prices." The situation in the Sarre, Lorraine and Luxembourg districts still remains an animated one, both in iron and coal. There is a plan on foot to found a banking union for Alsace-Lorraine, with exchanges at Strasbourg, Metz and Mulhouse. A reaction and decline are noticeable in the Schlesien and Nassau districts. In the Lower Rhine and Westphalian countries the quiet continues; sales, both of iron and coal, being less extensive there is no particular change in Silesia. Metals.—Copper is a little better. We quote Drontheim 50 marks the 50 kilos. Refined Ingots, 78 @ 85. Tin is firmer: Banca and English, 98, ditto Refined, 99, and Australian, 100 marks. Lead is dull and a lot of Spanish has sold below our quotations. We quote English Pig 20.25 @ 20.50; ditto Sheet, 20.60 @ 21; German Pig, 19 @ 19.50, and ditto Spanish, 21. Spelter is unaltered. We quote Silesian, spot and to arrive, 22; Silesian, selected Zinc, 27 @ 27.25, and Vieille Montagne, 27.40, all ordinary numbers.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, March 13, 1880.—Iron.—The iron works are still in good position—nay, there is even an improved outlook, but the dealers show considerable weakness. We do not see any well founded cause for the latter, for we hear that there are negotiations on foot for Bar Iron and Hoops for cotton bales for America, and the demand for Old Iron is unabated. The Southern Railroad Co. had some old Rails for sale and has even withdrawn them since, hoping to do better. The 2689 metric centweights of Old Rails which the Northern Co. had for sale have been bought by a Moravian work at 6.50 florins the cwt. The St. Petersburg Putzloff and Alexandrowsky Bessemer Co. has inquired about Bessemer Pig. The 10,000 tons of Steel Rails which the Southern Russian railway of Florence stood in need of will be furnished by an English company. The Alta Walla Co. now want 8000 tons, and we trust the large dimensions of the rail will prove no obstacle for our rail makers as it seems to have been the case in the former instance. The retail trade in hardware is developing satisfactorily.

EAST INDIES.

(Schmidt, Kustermann & Co.)

PEWANG, Feb. 6, 1880.—Tin.—The market opened at \$31 @ \$31.10 per picul, at which price a large quantity has been taken, there being a drop soon after, however, carrying it down to \$28.75, from

which it rallied to \$29.25, the closing figure. The bulk was taken for the United States at \$33.75 @ \$31.10; the balance, 2000 piculs, for India and China, at \$31 @ \$31. Stock in bazar, 2000 piculs. Exchange.—Soon after the opening of the last mail more firmness began to prevail, but it was of short duration, the banks reducing their rate for four months' sight drafts from 3/10 to 3/4, drawing for this mail at 3/4.

CHILI.

(Weber & Co.)

VALPARAISO, Jan. 27, 1880.—Copper.—Since our last report the market has remained well disposed for business. At first holders offered their Copper sparingly, but upon receipt of more favorable European advices, and greater willingness on the part of purchasers to meet the raised pretensions of holders, large parcels sold without difficulty at rising rates, the sales being 10,400 quintals at \$16.00 @ \$19.25 on shore here; 2000 Huibordo at \$19 @ \$19.50; 8000 sundry lots at \$17.70 @ \$19.75 on board; 4000 Chanaral at \$19; 21,000 Lota at \$20.80 on board, and 32,000 Regulal at \$22.50. Freight, which had been looking up toward the middle of the month, have quieted down again, there having been numerous arrivals and no return freight offering beyond copper and wheat, guano and nitrate being of no account. Copper charters have been made for Liverpool and Swansea at \$20 @ \$25. Exchange has varied little or not at all. The demand for bills is active at 36 1/2 @ 36 3/4, per dollar, 90 days' sight on London.

The Nickel-Plate License Question.

Those interested in nickel plating are awaiting with much anxiety, and some little impatience, the issue of the contest before the courts of the acid and alkaline solutions. We had hoped a decision would have been reached before this, but the question is still pending.

It is understood from those who have been in correspondence with Dr. Adams, that he is not disposed to concede anything to those who would be willing to license for another year under somewhat more favorable terms, but that he intimates an intention to advance rather than reduce the license, and says that there will be difficulty in securing the right to use his solution if arrangements are not made before existing licenses expire. As the time which remains is very short, it is considered probable that many who depend upon nickel plating in their business will submit to what they consider injustice, rather than take the risk of getting into trouble, feeling sure that before another year new developments will change the aspect of the question.

In Newark, where there is an extensive nickel-plate interest, the opinions of those in the business seem to be divided. Outside of New York several leading houses have licensed under one or other of the three patents lately issued for solutions different from that claimed by Dr. Adams. Some well-informed Newark platers are said to feel quite safe in ignoring Dr. Adams and placing themselves under the protection of the New Jersey Circuit Court. Judge Nixon, of the New Jersey Circuit, is quite a chemist, and it is said he has for years plated successfully with nickel in an amateur way by the Goro process. If this is true, it is believed he will hold a very different view of the position of Dr. Adams' patent from that taken by Judge Blatchford. This, at least, is the gossip of the trade, and we give it without any personal knowledge of the facts. Dr. Adams and his associates appear to feel very strong and confident, and seem determined to put on the screws. We are sorry that we have no specific information to give our readers, but until Judge Blatchford's decision on the question of plating with an acid solution is rendered, it will be difficult to form any opinion as to the best course to pursue to avoid trouble and secure uninterrupted working under moderate royalties.

Direct Trade with Spain.

For 18 months past two steamers, the Castilla and the Vidal Sala, have been sailing under the Spanish flag from this port direct to Barcelona, Spain, and it is probable that in the near future a regular steamship line will be established between the two places. The vessels are owned by Spaniards residing in Barcelona, and the New York agents of both are E. Puig & Co., No. 40 Broadway. A member of this firm stated yesterday that these vessels used formerly to ply between Barcelona and Havana, but in the fall of 1878 the sugar and cotton crops in the latter place, on which they depended for their freight, were very scant, and, as the grain crop of that year had failed in Spain, Mr. J. Gurri, the owner of the Castilla, conceived the idea of sending his ship to this port and bringing back a load of produce. His first venture was very successful, and this caused Sala & Vidal, the owners of the Vidal Sala, to place that vessel on the same route. It takes about two months for the round trip, and since they started the steamships have made seven of these trips. Each succeeding voyage has proved more profitable, and of late their cargoes have included grain, cotton, lard, bacon, hardware, sewing machines, agricultural implements, &c., thus opening a new market for American produce and manufactures, as the people resident in Barcelona were accustomed to receive these articles previously from French, English and other European sources. The New York agents say that the business has increased to such an extent that a movement is on foot to establish a regular steamship line, and to stop competition between the owners of the rival vessels. They state that, although the two steamships are of iron and well-built, they are too slow for ocean traffic, and Spanish capitalists are now negotiating for the building of several new vessels, which will compete in strength and speed with any now sailing to European ports. The Castilla and Vidal Sala, he said, have excellent accommodations for passengers, and the new vessels will be constructed with all modern improvements in this respect.

The Castilla sailed on her last voyage on March 15, and the Vidal Sala, which is now in port, will follow in about two weeks. The former will arrive here on her return voyage in the latter part of May, and will be ready to start on her next trip about June 1.

It is stated that Messrs. Means, Kyle & Co., of Hanging Rock, Ohio, will send a large load of Hanging Rock coal to Pittsburgh to be coked, returned and its quality tested.

PATENT DECISION.

Hardware dealers will please take notice of the decree of Judge Lowell, of the United States Circuit Court, in the case of Millers Falls Company against Quimby S. Backus, for infringement of Bit Brace Patents, which decree was in favor of the Millers Falls Company. The full text of the opinion may be found on page 11 of *The Iron Age*, of date December 18, 1879.

We have now obtained three separate decrees against three different manufacturers, and shall continue to prosecute all infringers. When the manufacturers are able to pay the damages we shall in no case trouble dealers, but when manufacturers are unable to pay we must ask the dealers to remunerate us, else responsible dealers might combine with irresponsible makers to render worthless the most valuable patents. Any reasonable man can see the point, and we have before given all dealers sufficient notice.

MILLERS FALLS CO.,
74 Chambers street, New York.

PATENT

ANTI-WINDOW

RATTLER,

FOR

Dwellings, Cars, Steamboats, &c.

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NOTE.—These Stoves are made under license from the Kerosene Lamp Heater Co., the royalties are paid by me, and the Stoves have license tags attached, so that dealers may purchase and sell them with perfect safety.

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Price, \$3.00.

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We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any Measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.

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PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address

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Philadelphia "STAR" Bolt Works.

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FANCY HEAD BOLTS,

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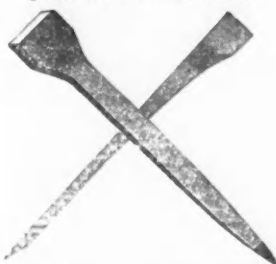
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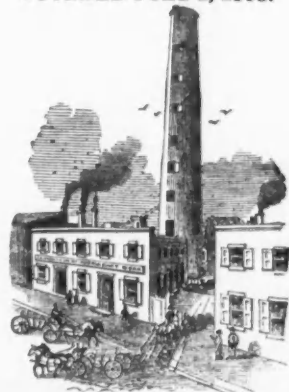


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The Oldest Shot Tower in America.
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Warranted thoroughly made
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GENUINE IMPROVED AND MECHANICS

Wide Bar Full Length.

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UNDER PATENTS DATED

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OUTSTRIPS ALL COMPETITORS.

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Every Machine Warranted to Work as Represented.

Points Claimed as being Meritorious:

Lightness combined with Strength in construction.
It runs more easily.
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It requires less repairs.
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It is the lightest machine in use, and all that is necessary to satisfy our customers of its superiority is to place it in competition with any other machine in the town in which they may reside.

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Width of Cutter.	Style.	Power required.	Weight.	Price.
10 inch.	A Child.	30% lbs.	14.00	\$14.00
12 "	"	"	18.00	"
14 "	A Lady.	30 "	20.00	"
16 "	"	"	22.00	"
18 "	One Man Size.	40 "	24.00	"

NEW MACHINES,

For Cutting Long Grass

15 inch, 10% inch Driving Wheels, 6% inch
Cylinder, Man Size, 48 lbs. \$23.00
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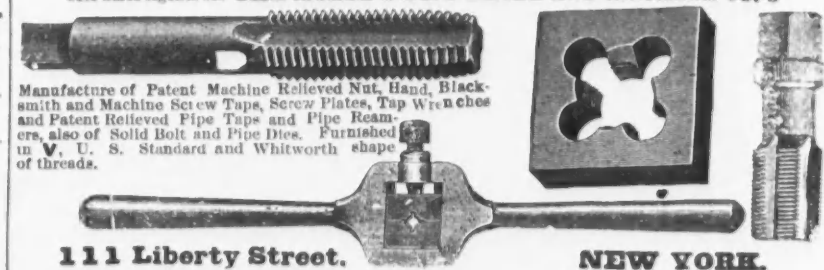
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8 inch, 10-inch, 13-inch, 15-inch (standard),
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Mixer, Scoop, Measure, Weigher, Egg Beater, Rice Washer, Tomato, Pumpkin, Starch, Wine and Fruit Strainer.

The greatest combination known, and pronounced by press and public the only first-class Sifter in the world. Made better of better stock, sifts much faster, and saves more material than all other Sifters. Made in two sizes: No. 1, 3 pts; No. 2, 5 pts. Liberal discount to the trade. Please mention this paper, and send for illustrated Price List.

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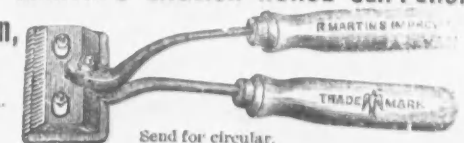
GALVANIZED SHEET IRON,

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Corrugated Sheet Iron, Black or Galvanized. All kinds of Ironwork, Tinned or Galvanized.

MARTIN'S ENGLISH HORSE CLIPPERS.

J. J. Shannon,
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PHILADELPHIA.



Recommended as the best Hand Clipper made.
\$3.25 EACH.
Extra pieces for sale.

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MINING AND MINERAL ITEMS.

IRON.
Large quantities of iron ore exist 12 miles north of Butler, Pa., which was developed years ago in the interest of the Hickory and Etna Furnace, on Slipperyrock Creek. Ore mining throughout York County, Pa., was never carried on so extensively as it now is, and scarcely a day passes but that new banks are opened in various localities throughout the neighborhood. Some of the best ore banks in the State are located in Heidelberg township, within a few miles of Hanover, and hematite ore of good quality is being taken out daily in large quantities and shipped to furnaces in various parts of the State. Notwithstanding the large quantities mined and shipped, it is said that the supply is not equal to the rapidly increasing demand.

COAL.
A rich coal field has lately been discovered within 20 miles of Pittsburgh, on the Pan Handle Railroad, which is attracting the attention of home and outside capitalists. The find is located on Chartier's Creek, and adjoins the lands lately purchased by the Keystone Coal Company. Two veins—one 6 feet and the other 11—have been found, the former being close to the surface and the latter 40 feet below, making the work of mining an easy task. The coal is known as "coking coal," and if the capitalists at present looking at the property effect a purchase, employment will be given a large number of men, as coke works will probably be started.

PRECIOUS METALS.
A special dispatch to the *Daily Mining News*, dated San Francisco, March 16, says: The Tombstone mine, Arizona, has at last been secured for the Eastern market. Diss-ton, the great millionaire saw manufacturer of Philadelphia, and the Corbin Brothers, New York, hardware merchants, have bought the Schieffelin interest for \$2,000,000. Their party will leave at once for New York. The mine is well known in the East through Gov. Safford and the Corbins, who have been interested in it for a long time. A number of previous efforts to take the control East have failed. New and very extensive ore bodies are constantly being developed in the Tough Nut, one of the Tombstone mines. Two mills are now working the ore from this mine, and more machinery will soon be added. The four other mines belonging to the company look well, but the ore from them cannot be worked until more machinery is added. Regular monthly dividends of \$50,000 will be resumed May 1. The company will be reorganized at once under the laws of the State of New York, and the stock made non-assessable.

The First Water Works at Pittsburgh.

Mr. Robert King furnishes the *Pittsburgh Commercial* with the following memoranda concerning the building of the first water works in Pittsburgh:

An ordinance providing for the raising of a sum of money on loan for supplying the city of Pittsburgh with water was passed Feb. 16, 1824. The first lot for an engine house on the bank of the Allegheny River was bought for \$1425, and the lot, 240 feet square, known as the Grant's Hill purchase, was bought for \$3800. The first revenue was realized in the year 1829 and amounted to \$3086.

By items taken from the books it appears that the total cost of the lots, buildings, reservoirs, pipes and machinery, was as follows:

To February 1, 1855.....\$92,893.03
Permanent extensions, 1856.....5,704.60
Permanent extensions, 1857.....51,555.15
Permanent extensions, 1858.....934,304.27

Total cost to February 1, 1859.....\$984,457.14

An ordinance authorizing the construction of the upper works passed June 15, 1843. The works were completed and in operation Nov. 1, 1850, the cost being included in the above.

From the oldest minutes of the Water Committee that I have found I see that a meeting was held on the first day of June, 1827. Present, Messrs. Thomas Bakewell, Hauer Denny, Alexander Johnston and John Arthurs. The title papers of the lot conveyed by Freeman & Miller, on the Allegheny River at the mouth of Cecil alley, having been examined by Neville B. Craig, solicitor for the city, and approved by him, were received and the deed directed to be put on record.

On motion, it was resolved that an order be drawn in favor of Freeman & Miller for the sum of \$1425, the consideration in full for the lot conveyed by them. Order on the Mayor drawn accordingly.

Resolved, That all certificates to workmen and contractors for pay be presented to the committee on the afternoon of Fridays.

Special Notices.

Hardware Shelving and Fixtures For Sale.

The undersigned, having bought the stock of the late C. F. Humes, Taunton, Mass., have on hand the complete Shelving of the store. The store was fitted up about three years ago by S. Washburn, Jr., and has been well known throughout New England as the "model store." The shelving is conveniently arranged for the different sorts of goods in a retail hardware stock, and was put up entirely with screws, so that it can be taken down and erected elsewhere without the slightest injury. This presents an unusual opportunity for fitting up a store on one of the most elaborate, complete and convenient plans ever devised, and at half what it would cost now. Also for sale, 2000 green Paper Boxes, with wood ends, thoroughly dried, adapted for every conceivable article of hardware, and fitted for above shelving.

BURDITT & WILLIAMS,
20 Dock Square, Boston.

J. WALDRON,
Manufacturer of
Sprout's Double and
Single Shear
HORSE FORK,
And
Sprout's
HAY ELEVATORS,
PULLEYS and
GRAPPLES.
Send for Circulars.
Maury, Lycoming Co., Pa.

Special Notice.

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NEW YORK,

OFFER

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IN

QUALITY AND PRICE

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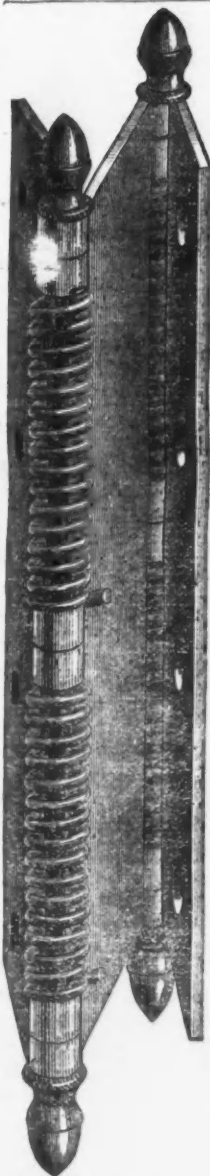
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and

Scotch

Foundry

PIG IRON.



Watchman's Improved Time Detector,

with Safety Lock Attachment.

Patented 1875-6-7.



Beware of imitations. This instrument is supplied with 12 keys for 12 different stations. Invaluable for all concerns employing night watchmen. Send for circulars to
M. IMHAUSER,
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P. O. Box 2875.

Mellert Foundry and Machine Co., Limited,

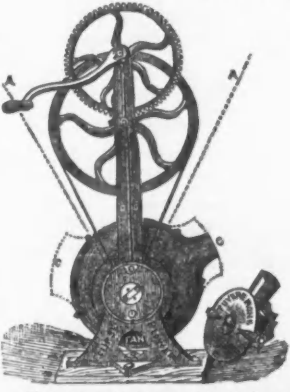


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Cast-Iron
Water and Gas Pipe
of all sizes.

Valves and Hydrants, Flange Pipe and Lamp Posts. Machinery for Grist, Saw and Rolling Mills. Also the celebrated CANADA WATER WHEEL, the cheapest and best in the world. Send for pamphlet, READING, PA.

THE IMPROVED ECLIPSE FAN BLOWER,

With Lever or Crank Motion.



Address EXTRA F. LAMER, Sole Mfr., Lancaster, Pa. or the principal offices: W. C. Dyerkin, New York City; Jos. Schwartz & Co., New Orleans, La.; Silgo Iron Works Co., St. Louis, Mo.; S. D. Kimball, Chicago, Ill.; Stevens & Garrigue, Leavenworth, Kan.; Theo. W. Herr, Denver, Col.; W. J. Halliday & Co., Indianapolis, Ind.; Huntington, Hopkins & Co., Sacramento, Cal.; T. Moore, Sydney, N. S. W., Australia, or Pell, Stedall & Son, London, England.

SPRING HINGES

WITH

Patent Anti-Friction Springs,

FOR

SCREEN DOORS.

PRICE LIST.—Per Dozen Pairs.

SINGLE JOINT HINGES.

(To Swing one Way.)

SIZE.	WITHOUT ACORN TIPS.		WITH ACORN TIPS.	
	BRASS.	NICKEL PLATED.	BRASS.	NICKEL PLATED.
2 3/4 inch.....	\$ 3 00	\$ 4 50	\$ 5 00	\$ 6 50
3 ".....	4 50	6 50	6 75	8 75
5 ".....	7 50	10 00	10 00	12 50

DOUBLE JOINT HINGES.

(To Swing both Ways.)

To be used on Door 1 inch thick, or less.

SIZE.	WITHOUT ACORN TIPS.		WITH ACORN TIPS.	
	BRASS.	NICKEL PLATED.	BRASS.	NICKEL PLATED.
2 3/4 inch.....	\$ 6 60	\$ 9 00	\$11 50	\$14 25
3 ".....	8 30	11 50	13 50	17 00
5 ".....	16 50	21 00	21 50	26 00
6 " Double for Office Doors.....				54 00

The large cut represents full size of our 5-inch Double Joint Acorn Tip Hinge for mortising. The small cut represents the plain Single Joint Hinges, but not full size. Sample pair will be sent by mail on receipt of price.

Liberal Discount to the Trade.

SCOVILL MFG. CO., Nos. 419 & 421 Broome Street, NEW YORK.



PUCSLEY & CHAPMAN, Man'rs & Dealers, 8 Liberty St., N. Y.

Over 50 different kinds of Wheelbarrows.
Over 12 different kinds of Trucks.

"THE BOSS" JACK-SCREW.

R. D. WYNN,

Windsor, Vt., U. S. A.,

Sole manufacturer of the above Screw. Indorsed by builders, railroad and mining men as the best screw jack in the market. Also manufactures Press Screws, Lead and Wire Presses, Tackle Blocks, &c. Circulars and prices, address as above. (Please say *The Iron Age*.)

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FOR OLD AND NEW BUILDINGS.

Just What is Wanted, and Much Cheaper than Weights.

AN ARTICLE ALWAYS WANTED.

We beg to call your attention to

THE PATENT "SCREW WINDOW BALANCE,"

An Adjustable Substitution for Sash Weights.

Capable of being made of any power, but now made for medium and high sash only (20 pounds and under).

The Device is a mechanism, controlled by an Adjusting Screw; a mechanical power; limited by the length of hinging lugs, stiffness of window jambs, and strength of material composing the Balance.

In Use.—The "Screw Balances" retain medium and light windows at any point of opening with surplus power in reserve, available, when wanted, by drawing the adjusting screws. By steadying and relieving the sash from friction against the window

Automatic.—While raising the sashes, the rollers revolve freely; in holding the roller bearings are instantly transferred to the arms of the balance clamp, arresting the roller from turning or sagging with the sash. In lowering, the sashes slide down over the face of the roller, (over four inches in circumference), the edges of the sash being unpainted, and rarely sliding over the roller twice at one point of its circumference, its durability is evident. The rollers always maintain their roundness by this distribution of wear. They are as easily applied as the common sash pulley, and render the use of weights, boxed frames, cords, pulleys, &c., with the perplexing task of hanging the same, unnecessary, to obtain good working sashes. The sashes are both locked at one operation, by the meeting rail lock, as with weights.

Great Durability.—The roller part of the balance is subject to wear; this is guarded against in the special compound used in the construction of its wearing surface.

The balances have been in use nearly two years, and from constant service show no evidence of injury by wear. Actual service in a frame with sashes, run from one to five hundred times a day for months, prove that the rollers will last from 25 to 30 years, they are quickly, cheaply and easily replaced, if ever worn out.

Prices, 50 CENTS AND ONE DOLLAR PER WINDOW.

10 to 20 lb. sashes (4 balances).....\$1.00 per window.
20 lb. sashes and under (2 balances)......50 "

COMPARATIVE COST WITH WEIGHTS.

10 lb. sashes hung with weights, boxing, &c.,.....\$2.00 per window.
" two balances applied......63 "

Balances saving, \$1.37 "

Reference will be given, if required, to numerous parties who have largely used these goods the past two years, and who are still using the same. Liberal discounts to the trade.

INFRINGEMENTS.—To whom it may concern:—As the inventor, patentee and solely authorized maker of the above named goods under the mentioned U. S. Patents covering the combined inventions constituting the Screw Window Balance, and all other similar goods using these combined improvements being infringements of the said combined inventions, patented as before stated, all dealers, users, makers and handlers of such are hereby notified that they will be held accountable, under the U. S. laws protecting inventions, for damages.

Sample set, 4 balances, mailed free to any address, for One Dollar. Address orders, &c., to

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Sole Manufacturer Screw Balance, Wethersfield, Hartford County, Conn.

COULTER, FLAGLER & CO.,

87 Chambers and 69 Reade Sts., New York,

Hardware

Manufacturers'

Warehouse.



Forsyth's Patent Roller Skate. Patented Feb. 12, 1878.

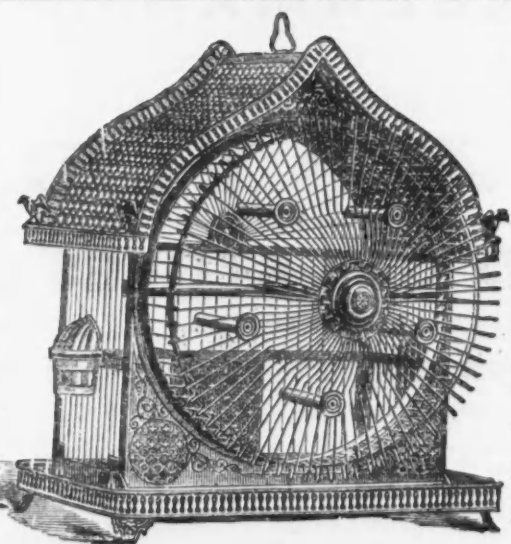
Office and Warehouse of Union Hardware Co., New Haven Tool Co., Draw Knives, Chisels, &c.; Deuse Bros., Bitts, Corkscrews, &c.; Richardson Bros., Saws of all kinds; Brooks Edge Tool Co.'s Axes, Hatchets, &c.; M. Price, Hatchets, &c.; J. & W. Rothers, Extra Hand Cut Files; L. P. Frost, Carriage Bolts, Bolts and Nut Iron; Cowles Hardware Co., Screwdrivers, Mining Knives, &c.; Rider, Wooster & Co., Anti-Friction Barn Door Hangers, &c.; H. B. Hawley, Shears of all kinds; Walden Knife Co., Pocket Cutlery; American Screws; N. Y. Anti-Friction Metal Co.'s Babbits Metals; Howard, Razor Straps; G. Forchner, Spring Balances; P. Lowen-trout & Co., Dividers, Callipers, &c.; Shepard Hardware Co., Fluters, Blind Hinges, &c.; Saxton & Amedon, Braces, all kind; Bevia Bros. Mfg. Co., Bells, all kind; B. H. Parsons & Bro., Flyers, Nippers, &c.; C. L. Griswold, Cast Steel Bits; Lancaster, Lock Works, Jail Locks.

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BIRD CAGE.

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The Revolving Perch Cage must be seen in practical operation to be able to appreciate what a charming novelty it is; or the great advantage to the bird, in the way of exercise, which all canaries require to keep them healthy, and consequently in song.

Catalogue sent to dealers only on application.

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For Mines, Quarries, Dock Building, &c.

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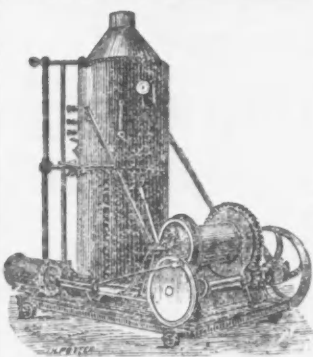
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Horse, Mule & Snow Shoes of the Perkins Pattern.

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PATENTED JANUARY, 1868, and DECEMBER, 1874.

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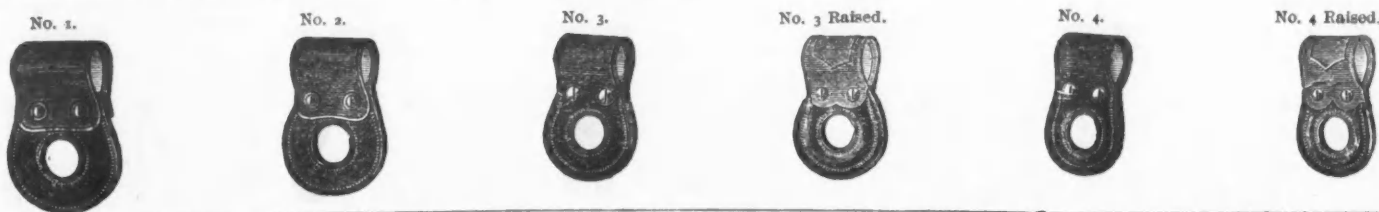
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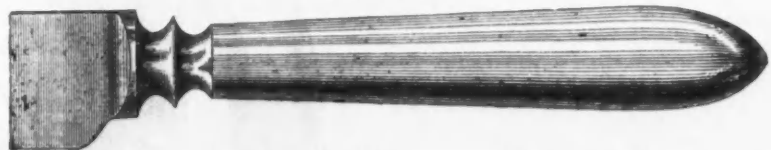
Corn Knives, Bush & Weed Scythes.

GREENFIELD TOOL CO.

(GREENFIELD CUTLERY CO.)

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MANUFACTURERS OF



Fine Table Cutlery.

Solid Handled, Bone, Ivory, Rubber and Wood, Solid Steel Silver Plated.



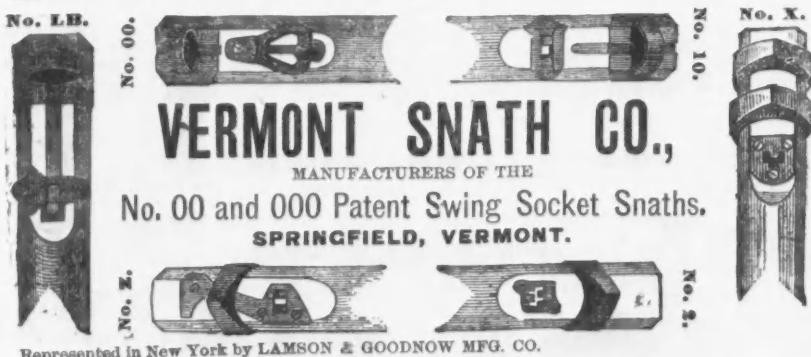
PATENT CONCAVE FORGED OX SHOES.

Also, **FLAT** **SHOES** with **TWO CALKS** at same price.



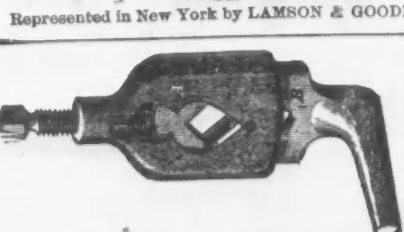
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It is very strong. Holds very strong. Will not deface finished work. Holds round square or irregular work. Always stands up square with the work and will not "skew." Is more evenly balanced than the common dog. Send for circular.

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The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for exports as well as home trade, and it seems destined to take the place of all other Hay Knives.

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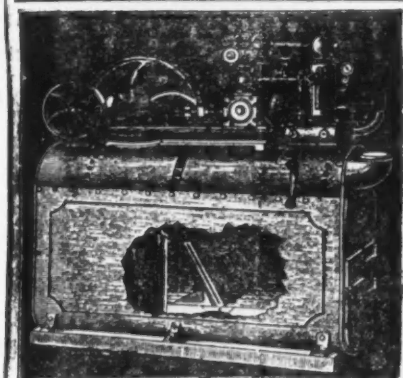
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HOISTING MACHINES,

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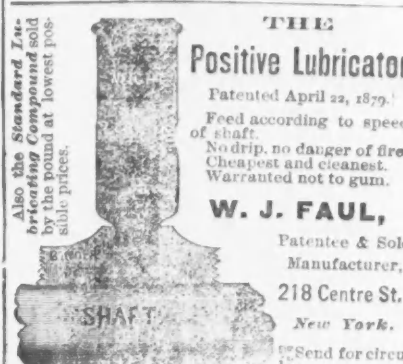
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Feed according to speed of shaft.

No drip, no danger of fire.

Cheapest and cleanest.

Warranted not to gum.

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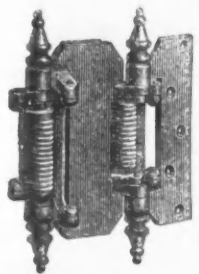
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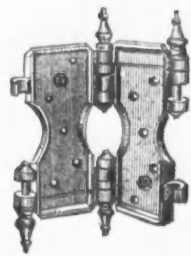
For all Styles Carriages and Wagons.

Annual production 125,000 sets.

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DOUBLE ACTING BUTT.



DOUBLE ACTING BLANK.

*Air Cushion Door Springs,
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Jewett's Patent Spring Gate Hinges,
Cast Steel Mincing Knives, Hammered,
Tack Hammers and Claws,
Forged Cast Steel Screw Drivers, all varieties,
Garden and Ice Tools,
Carpenters' Awns, Cleavers, Cake Turners,
Box Scrapers,
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THE COWLES HARDWARE COMPANY,

Unionville, Conn., U. S. A.,

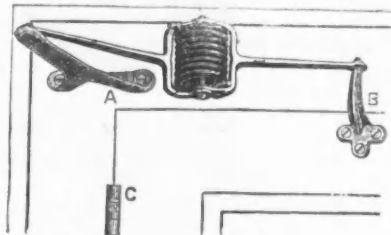
Manufacturers of Household Hardware

Geer's Single and Double Acting Spring Butts and Blanks.

Reverse in principle. Placing the power where most needed, viz.: **EXERTING** their **GREATEST FORCE** when the door is **CLOSED**; offering **LESS RESISTANCE** the **WIDER** the door is **OPENED**; **RETAINING** the door **OPEN** after passing the right angle; **HOLDING** the door **UP FIRMLY** at the **TOP**.

Also, **BLANK BUTT**, designed to be used in combination with our Double Spring Butts on Inside Doors of Dwelling Houses, Churches, Hotels, Restaurants or in any position where the doors are not subject to strong currents of air. With our New Blank Butt we furnish for inside doors the most effective as well as the cheapest Spring Butt in market. **Butts & Blanks for Screen Doors a specialty. Hercules Springs for Screen Doors a specialty.**
Perfect in Action, Very Low in Price.

Send for Catalogue or Circulars with price lists. Mention this paper.



HERCULES

Reverse Action Door Spring & Retainer.

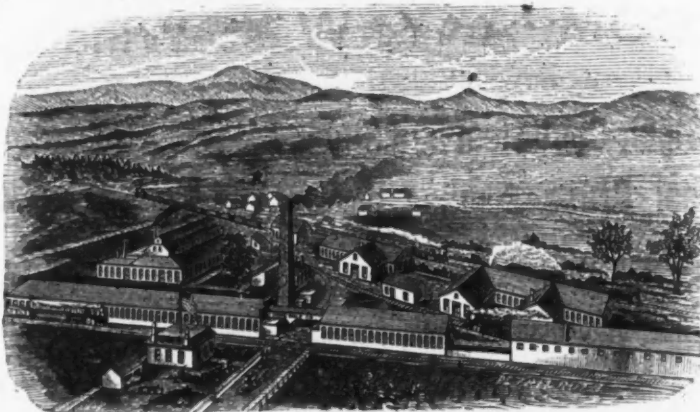
New principle, distinct from all others. Holds the door open as well as shut. Exerts its greatest force at the closing point. The best Spring in market.

THE IMPROVED HOWE SCALES.

Made in Every



Variety



Works at Rutland, Vt.

and Adapted to any

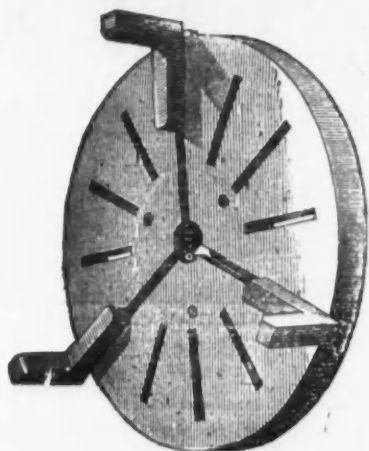


Standard.

The highest Awards have invariably been given the Improved Howe Scales wherever exhibited in competition with other makes.

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Front View.

THE HORTON CAR WHEEL CHUCK.

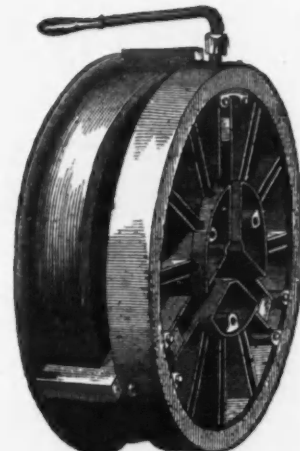
This Chuck can be attached to a boring machine table, or lathe, and will hold a car wheel 37 inches in diameter and less. The jaws are made long to fit both tread and flange of car wheels, thus truing them both ways. For general machine work it is very useful, and will hold firmly any work that can be held in a Chuck.

THE E. HORTON & SON CO.,

MANUFACTURERS OF

THE HORTON LATHE CHUCK

Windsor Locks, Conn., U. S. A.



Back View.

THE HORTON CAR WHEEL CHUCK.

This cut represents the Horton Car Wheel Chuck holding a car wheel in proper position for boring, the flange and tread of the wheel assuming a true position on the jaws. For accuracy and ease of operation this Chuck has no equal.

THE HARTFORD MACHINE SCREW CO.,

MANUFACTURERS OF

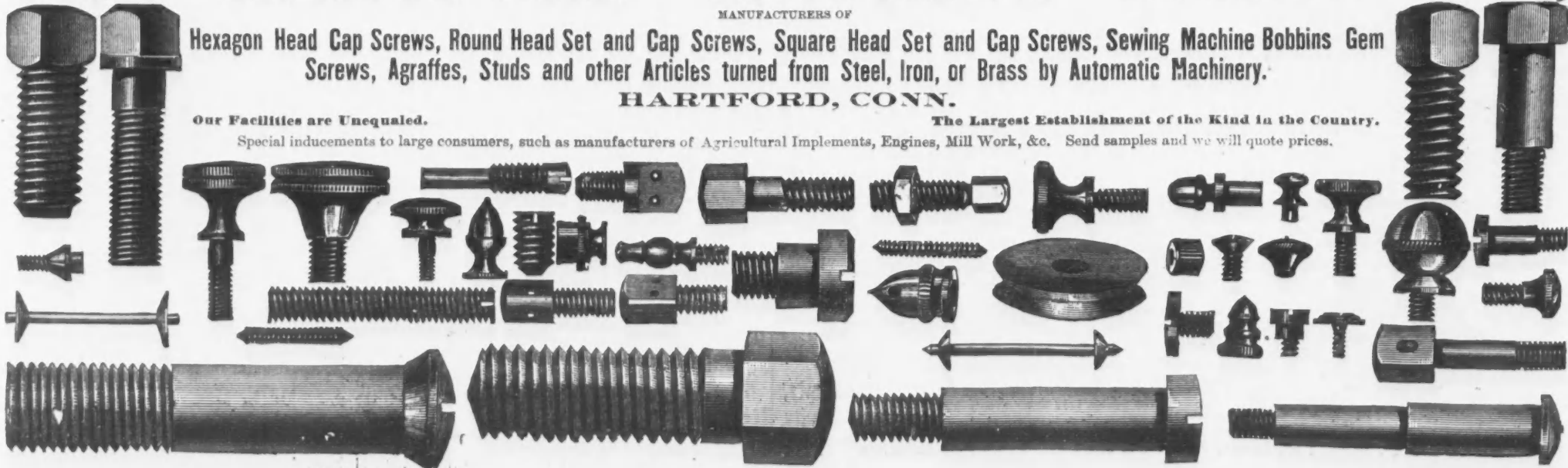
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The Largest Establishment of the Kind in the Country.





Ice Picks & Housefurnishing Hardware
MANUFACTURED BY
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MANUFACTURERS OF SUPERIOR

**SHOVELS, SPADES
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SPECIALTIES:

Mining Shovels, Hammered Solid Steel
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OFFICE, 912 Washington Ave.,
SAINT LOUIS, MO. FACTORY,
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WM. H. HASKELL & CO.,
Pawtucket, R. I.

MANUFACTURERS OF

COACH SCREWS

(With Gimlet Points),

ALL KINDS OF

Machine and Plow Bolts,
FORGED SET SCREWS,
AND
TAP BOLTS.



Peerless Tea Kettle.

The most durable and handsome kettle in the market, having the breast, sides, and a strengthening portion for the spout all spun from one piece of sheet metal and double-seamed to the pit, so that the seam is brought under the sides of the kettle, forming a strengthening rib of four thicknesses of metal, at the point of greatest wear, upon which it rests when on the stove. By this means the objections to all other copper kettles are overcome. Sole manufacturers,
SUNDY MFG. CO., Buffalo, N. Y.

**MCDONALD'S
QUICK AND EASY WASHER.**

THE MOST THOROUGH
AND PERFECT WASHER
IN THE WORLD.

SAVES THE LINEN,
SAVES SOAP,
SAVES TIME

A Day's Wash can be done in two
hours. It will fit all kinds
and sizes of Tubs.

ALSO,

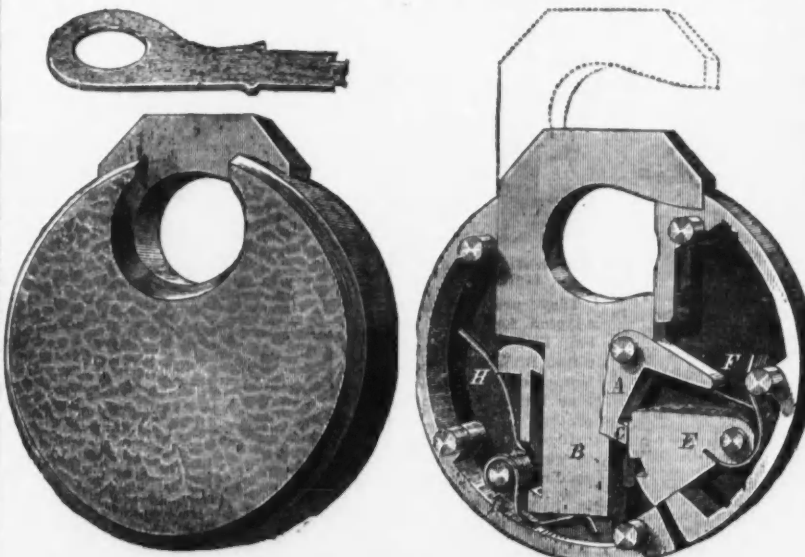
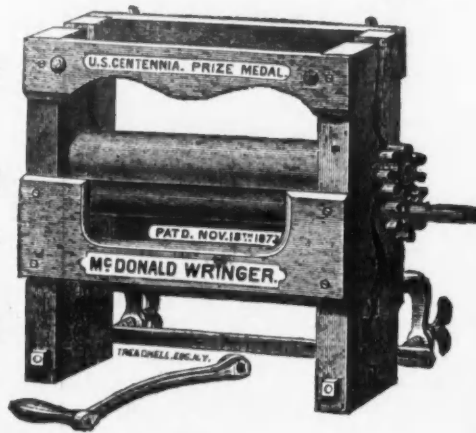
**MCDONALD'S
Centennial Prize Wringer.**

Warranted Superior
TO ANY WRINGER
In the World.

IT SELLS ON SIGHT!

Address all inquiries and send all
orders to

Graham & Haines
113 Chambers St.,
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BRASS PADLOCKS.
GREATLY IMPROVED.

For simplicity, compactness, durability, convenience and security they have no equal. Appreciated by all who use them. The best and most economical Padlock for all uses extant. Springs now made of the celebrated Phosphor-Bronze. We make these Locks with Master Keys when so ordered. Largely used by the U. S. Government, Railroads, Corporations, &c.

D. K. MILLER LOCK CO.,
821 Cherry Street, Philadelphia.

**THE STOCKWELL
SCREW & MACHINE
CO**

CLEVELAND, OHIO, U. S. A.,
MANUFACTURE

**BOLT AND PIPE
THREADING MACHINES,**
HEADS FOR LATHE ATTACHMENT,
Magic Screw Plates for Pipe and Bolts,
SET AND CAP SCREWS, TAPS, &c., &c.
Send for Catalogue.



As, Railroad and Miners' Pick and Sledge Handles, manufactured from selected Pennsylvania Hickory. Hand Hay Rakes. Hickory, Oak and Ash Lumber. Orders solicited from close buyers, who want reliable goods. Importers should apply direct to insure out best terms.
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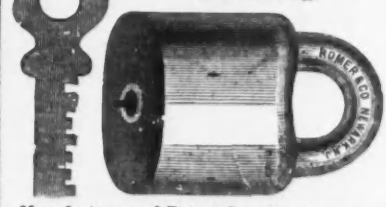
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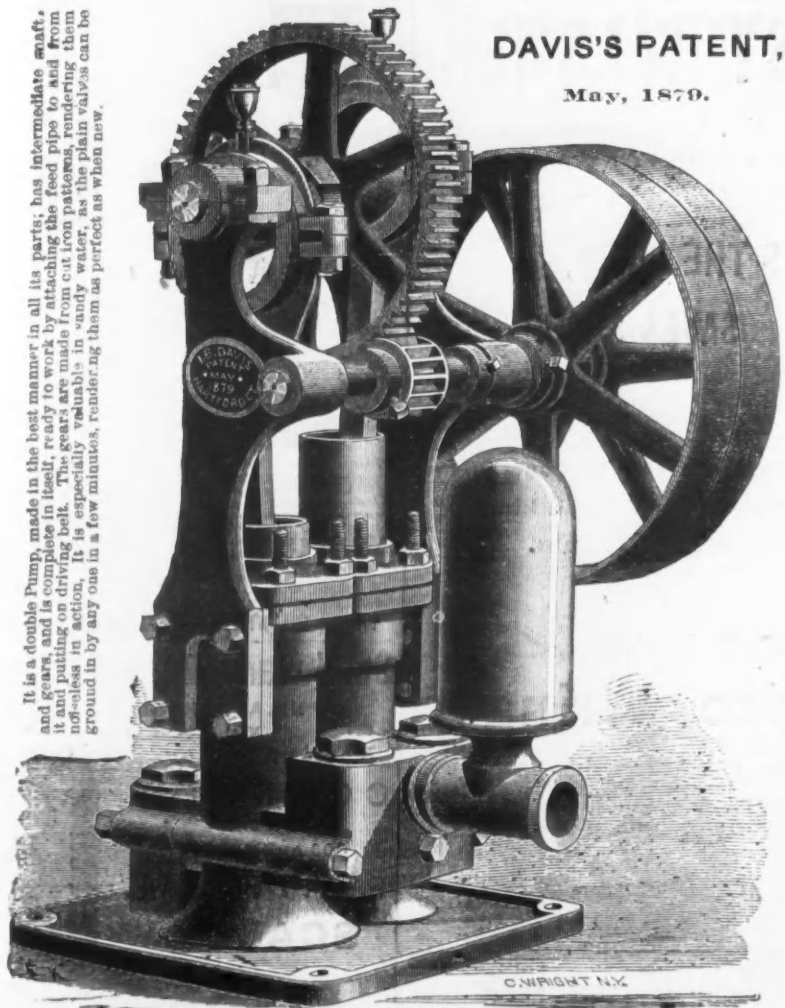
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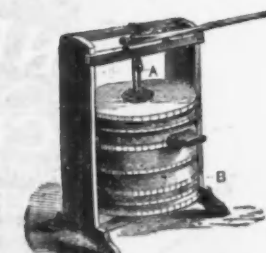
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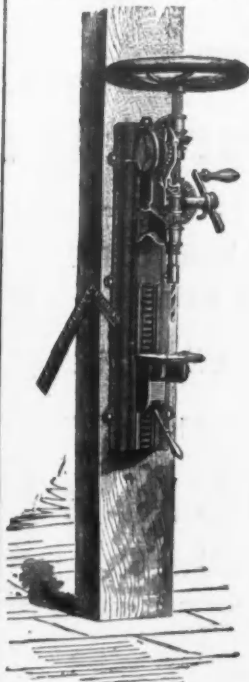
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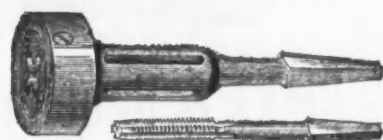
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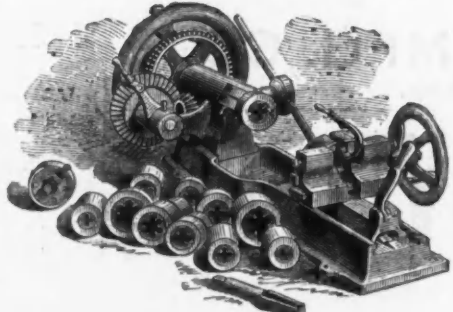


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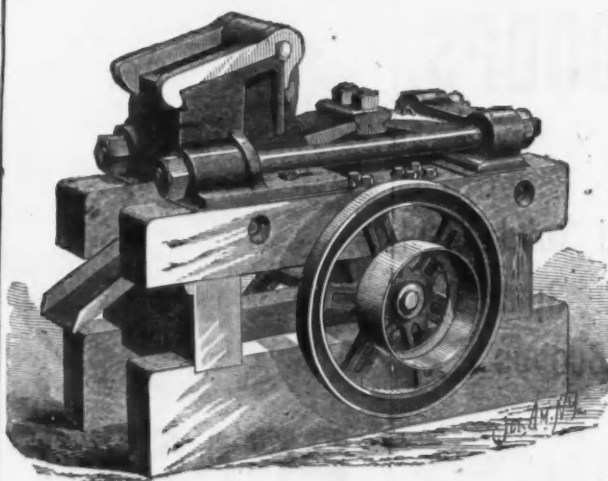
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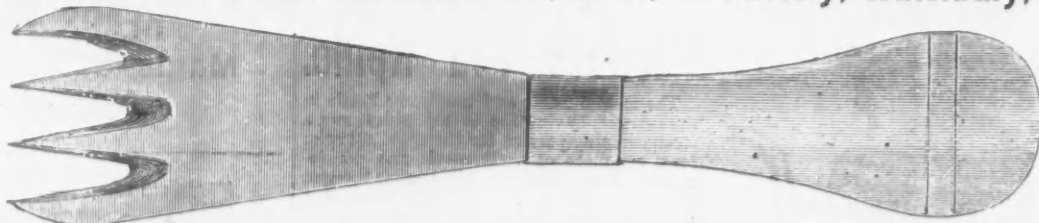
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The Iron Age Directory

and Index to Advertisements.

AGRICULTURAL IMPLEMENTS.

Grant Fan Mill and Cradle Co., Melrose, N. Y. 18

Hoover Drill Co., Richmond, Ind. 19

Wheeler & Melick Co., Albany, N. Y. 19

AIR COMPRESSORS.

Clayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y. 44

The Norwalk Iron Works Co., S. Norwalk, Conn. 44

Alarm Money Drawers.

Parker & Dorey, Indianapolis, Ind. 10

ANTI-FRICTION METALS.

Reeves Paul S., Philadelphia. 44

Asphalt, Mortar, etc.

Fisher & Norris, Trenton, N. J. 10

Architectural Iron Work.

Reina Iron Co. & Foundry, N. Y. 6

Chamberlin E. & Co., Cleveland, O. 6

Asbestos Materials.

The Chambers-Spence Co., foot 6th st., E. R. N. Y. 35

Axle Grease.

Meriam & Morgan, Paraffine Co., Cleveland, O. 26

Files, Manufacturers of.

Cook R. & Sons, Winsted, Conn. 8

Hutchinson & Co., Field & Co., 121 1/2 N. Y. 7

Lambertville Iron Works, Lambertville, N. J. 7

Shelton & Co., Auburn, N. Y. 27

Rabbit Metal.

Philadelphia Smelting Co., 12th and Noble, Phila. 27

Bag Holder.

Sorenson L. Jeff., Ashland, Ohio. 27

Barb Wire.

Scott H. B. & Co., Buffalo, N. Y. 18

Best Screws.

Shotton & Co., Birmingham, Ct. 27

Bellevue, Manufacturers of.

Scott Geo. M., Chicago, Ill. 31

Bells (Sleigh).

Bevin Bros. Mfg. Co., Easthampton, Conn. 26

Belt Hooks.

Browning, Sism & Co., 85 Chambers st., N. Y. 16

Belt, Makers of.

Alexander Bros., 412 N. 3d, Philadelphia. 29

Boards, Manufacturers of.

Foranburgh Wm. Fr. & Bros., Philadelphia. 29

N. Y. Belting and Packing Co., 37 Park Row, N. Y. 13

Black & Bemis, Cleveland, O. 17

Bleaches.

Pope Mfg. Co., 65 Summer, Boston. 44

Bird Cages, Makers of.

Jewett John & Sons, Buffalo, N. Y. 26

Blacksmiths.

Lindeman O. & Co., 254 Pearl, N. Y. 3

Blacksmithing.

Maxheimer John, 27 and 29 Pearl, N. Y. 3

Blitz Braces.

Backus O. S., 102 Chambers st., N. Y. 16

Boards, Manufacturers of.

Fray & Pizz, Bridgeport, Ct. 18

Boards, Manufacturers of.

Millers Falls Co., 14 Chambers, N. Y. 18

Boards, Manufacturers of.

Cooke William, 6 Cortlandt, N. Y. 41

Boards, Manufacturers of.

Emmott Portable Forge Co., Cohoes, N. Y. 42

Boards, Manufacturers of.

Holt's Cleveland Gauge Co., Cleveland, O. 42

Boards, Manufacturers of.

Keystone Portable Forge Co., 218 Carter, Phila. 42

Boards, Manufacturers of.

Foundry Furnaces.

Thermon S. & Co., Cincinnati, O. 17

Boards, Manufacturers of.

Paxson J. W. & Co., 511 Beech, Phila. 4

Boards, Manufacturers of.

Whitehead Bros., 417 W. 14th, N. Y. 4

Boards, Manufacturers of.

Fry Pans.

N. Y. Stamping Co., 411 Avenue A, N. Y. 35

Boards, Manufacturers of.

Furnaces, Makers of.

Richmond & Potts, 85 4th, Phila. 5

Boards, Manufacturers of.

Furnace Hoists.

Stokes & Parrish, Phila. 5

Boards, Manufacturers of.

Furniture Springs.

Carv & Moen, 234 W. 20th, N. Y. 3

Boards, Manufacturers of.

Galvanized Iron.

Hoopes & Menzies, 47 W. 14th st., N. Y. 2

Boards, Manufacturers of.

Lefferts Marshall, 20 Beekman, N. Y. 4

Boards, Manufacturers of.

Garden Tools.

Enterprise Mfg. Co., Geneva, Ohio. 29

Boards, Manufacturers of.

Gearing.

Barber W. H. & Bro., Allentown, Pa. 42

Boards, Manufacturers of.

Comly J., Lincoln Park, N. Y. 10

Elevator Buckets.

Rowland T. F., Brooklyn, N. Y. 18

Emery and Emery Wheels.

Ashland Emery Co., Perth Amboy, N. J. 36

Emery, Manufacturers of.

Lehigh Valley Emery Wheel Co., Weissport, Pa. 44

Emery, Manufacturers of.

Welmer P. L., Lebanon, Pa. 36

Engines, Air.

Sherrill Roper Air Engine Co., 91 Washington, N. Y. 42

Engines, Gas.

Schleicher, Schumm & Co., Philadelphia. 42

Engines, Locomotive.

Baldwin Locomotive Works, Philadelphia, Pa. 6

Engines, Steam, Makers of.

Barber W. H. & Bro., Allentown, Pa. 42

Engines, Steam, Makers of.

Davis A. J. & Co., Newark, N. J. 42

Engines, Steam, Makers of.

Lowgrove & Co., Philadelphia. 42

Engines, Steam, Makers of.

Shapley & Wells, Birmingham, N. Y. 42

Engines, Steam, Makers of.

Skinner & Wood, Erie, Pa. 42

Engines, Steam, Makers of.

The Norwalk Iron Works Co., S. Norwalk, Conn. 44

Engines, Steam, Makers of.

Veithert E. & Co., Chester, Pa. 44

Engines, Steam, Makers of.

Bunker M. E. & Co., Indianapolis, Ind. 10

Engines, Steam, Makers of.

McNab & Harlin Mfg. Co., 30 Gold, N. Y. 41

Engines, Steam, Makers of.

Faucett, Self-Measuring, Makers of.

Enterprise Mfg. Co., Pa., Phila. and N. Y. 42

Engines, Steam, Makers of.

Lane Bros. Millbrook, N. Y. 41

Engines, Steam, Makers of.

Files, Importers of.

Cart J. & Riley, 40 Gold, N. Y. 36

Engines, Steam, Makers of.

Auburn File Works, 34 Chambers, N. Y. 8

Engines, Steam, Makers of.

Harriet & Co., 141 and 143 Richmond, Phila. 8

Engines, Steam, Makers of.

Clark & Draper, Sing Sing, N. Y. 8

Engines, Steam, Makers of.

Disston Henry & Sons, Phila. 17

Engines, Steam, Makers of.

Hiscox File Mfg. Co., West Chester, Mass. 42

Engines, Steam, Makers of.

Johnson & Bro., Commercial, Newark, N. J. 8

Engines, Steam, Makers of.

McCaffrey & Bro., 123 and 125 N. 4th, Phila. 8

Engines, Steam, Makers of.

Nicholson File Co., Providence, R. I. 38

Engines, Steam, Makers of.

Phila. Chas. H. Williamsburg, England. 10

Engines, Steam, Makers of.

Fire Arms.

Conway T. G., 25 Chambers, N. Y. 38

Engines, Steam, Makers of.

Fire Brick.

Borgner & O'Brien, Philadelphia, Pa. 38

Engines, Steam, Makers of.

Brooklyn Clay Refractory and Fire Brick Works, Van Dyke St., Brooklyn, N. Y. 38

Engines, Steam, Makers of.

Franklin, 225 Fulton, N. Y. 38

Engines, Steam, Makers of.

Gardner Brothers, Pittsburgh, Pa. 36

Engines, Steam, Makers of.

Garrett & Sons, Philadelphia. 38

Engines, Steam, Makers of.

Kreischer R. & Sons, 48 Goreck, N. Y. 38

Engines, Steam, Makers of.

Maurel Henry, 233 East 2d, N. Y. 38

Engines, Steam, Makers of.

Newton & Co., Albany, N. Y. 38

Engines, Steam, Makers of.

Strander James & Son, Troy, N. Y. 38

Engines, Steam, Makers of.

Perth Amboy Terra Cotta Co., Perth Amboy, N. J. 38

Engines, Steam, Makers of.

Valentine M. D. & Bro., Woodbridge, N. J. 38

Engines, Steam, Makers of.

Vanderson John R., Perth Amboy, N. J. 38

Engines, Steam, Makers of.

Flint and Emery Paper and Glass.

Bader, Johnson & Co., 735 Market, Phila. 17

Engines, Steam, Makers of.

Fluting Machines.

Chicago Hardware Co., Buffalo, N. Y. 35

Engines, Steam, Makers of.

Forges, Portable, &c.

Boyle John, 121 East 1st, N. Y. 35

Engines, Steam, Makers of.

Buffalo Forge Co., Buffalo, N. Y. 41

Engines, Steam, Makers of.

Cooke William, 6 Cortlandt, N. Y. 41

Engines, Steam, Makers of.

Emmott Portable Forge Co., Cohoes, N. Y. 42

Engines, Steam, Makers of.

Holt's Cleveland Gauge Co., Cleveland, O. 42

Bonnell, Botsford & Co., Youngstown, O. 4

Borden & Lovell, 70 and 71 Wall, N. Y. 4

Carmichael & Emmens, 120 and 122 Cedar, N. Y. 4

Conroy Daniel F., 38 Washington, N. Y. 4

Croft & Co., 166 South, N. Y. 4

Everhart Jas. M., Scranton, Pa. 44

Fockett, Niles.

Baker Hermann & Steel, 101 Duane, N. Y. 32

Pots and Kettles, Ten and Coffee.

Diemel, Eisenhardt & Co., Phila. 42

Sundry Mfg. Co., Buffalo, N. Y. 42

Power Hammers.

Forstath S. C. & Co., Manchester, N. H. 42

Presses, Fruit and Vegetable.

Monck & Hudson Mfg. Co., Waterford, N. Y. 8

Presses, Power, Makers of.

Becher & Peck, New Haven, Conn. 43

Presses, Power, Makers of.

Biss & Williams, 169 Plymouth, Brooklyn. 43

Presses, Power, Makers of.

Merriman A. H., West Meriden, Conn. 43

Presses, Power, Makers of.

Peelless Punch & Shear Co., 52 Day, N. Y. 43

Presses, Power, Makers of.

Thames & Parker Press Co., Middletown, Ct. 43

Pulleys.

Rehfeld Block Works, Lockport, N. Y. 18

Pulleys, Manufacturers of.

Providence Tool Co., Providence, R. I. 18

Pumps, Makers of.

Douglas W. L., Middletown, Conn. 7

Pumps, Makers of.

Gunnison A. B., Erie, Penn. 7

Pumps, Makers of.

Harford Compressed Air Pump Co., Hartford, Conn. 7

Pumps, Makers of.

Rocke Brothers, Waukegan, Ill. 7

Pumps, Makers of.

Rumsey L. M. & Co., St. Louis, Mo. 7

Pumps, Makers of.

Runyon M. T. Co., N. Y. 7

Pumps, Makers of.

Railroad Supplies.

Saxton & Fennell, 101 William, N. Y. 33

Pumps, Makers of.

Leventon & Co., 101 William, N. Y. 33

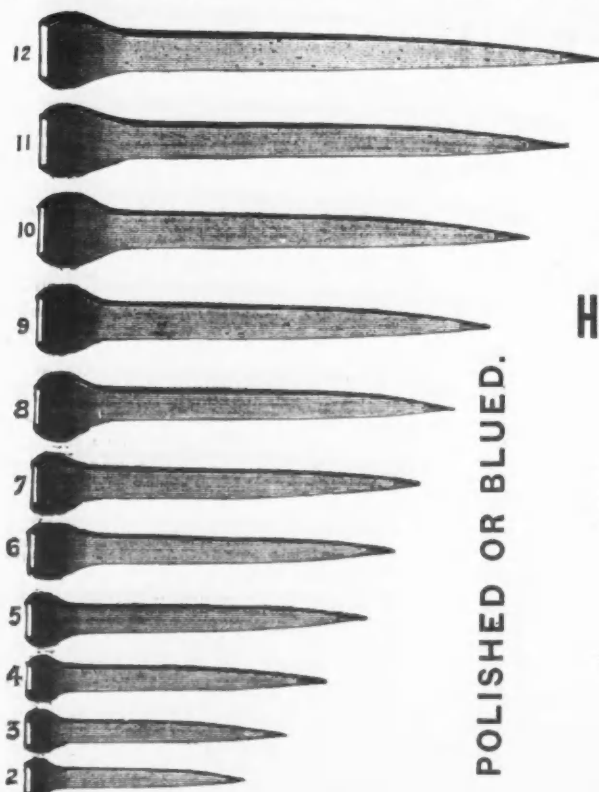
Pumps, Makers of.

Allentown Rolling Mill Co., Allentown, Pa. 5

Pumps, Makers of.

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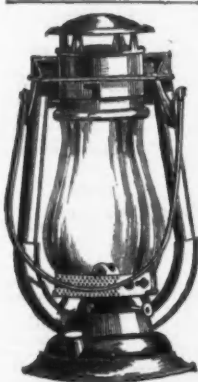
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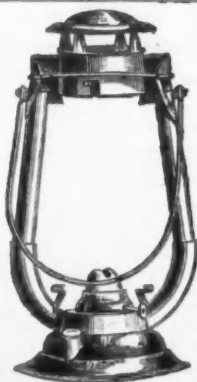
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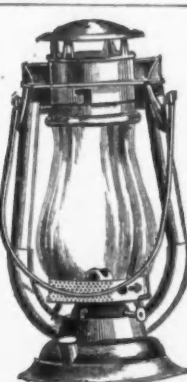


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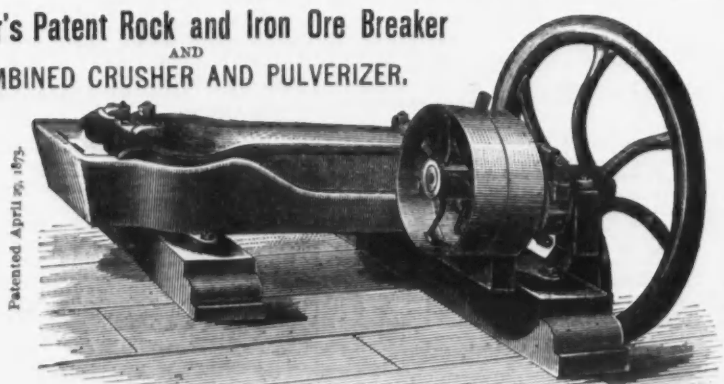
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Forster's Patent Rock and Iron Ore Breaker AND COMBINED CRUSHER AND PULVERIZER.



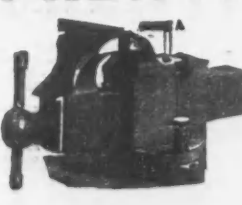
The Blake Crusher Patent has expired. After six years of practical and constant use at the Etna Iron and Nail Works, Bridgeport, Ohio, to which Company all desiring information are respectfully referred, the Forster Crusher has demonstrated its superiority. It requires but one-third the power to run it. It requires less than one-half the expense to keep it in repair. It is the simplest machine ever made to accomplish the same amount of work. The saving in steam to run it, and the saving in expense of keeping in repair will pay for it in one year, besides saving all the annoyance and expense of delays. It will break rocks or iron ore to any required size, and can be so adjusted as to pulverize to any required fineness. Its capacity with three inch belt is thirty tons from ore in ten hours. Larger machines in proportion. Every machine guaranteed as to efficiency, material and workmanship. We furnish of any required size—large or small. Its lightness and efficiency make it very desirable for gold and silver mining, all the parts being easily transported. We annex the testimony of a well known and thoroughly practical rolling mill manager:

OFFICE Etna Iron and Nail Co., BRIDGEPORT, Ohio, July 11, 1879.
Messrs. TOTTEN & CO.—DEAR SIR: I have been operating constantly in connection with our works for nearly six years, one of Forster's Crushers, manufactured by you, for crushing ore, used in our puddling furnaces. I have a thorough practical acquaintance with the Crusher in general use, and have no hesitation in saying that the Forster Crusher will crush ore with one-third the power of the Blake Crusher, and with one-half the expense of keeping in repair. The dies can be so adjusted as to pulverize. I take pleasure in saying, after using it six years, that it is the simplest, most economical and most efficient Crusher I ever saw. I am, Sir, very respectfully,
LEWIS JONES, Manager Etna Iron and Nail Co.

All communications addressed to us will receive prompt attention.

TOTTEN & CO., Rolling Mill and Heavy Machinery Founders, Pittsburgh, Pa.

PRENTISS PATENT VISES
ADJUSTABLE JAWS,
Stationary & Patent Swivel Bottoms
ADAPTED TO ALL KINDS OF VISE WORK.
HALL MFG. CO., 23 DEY ST., NEW YORK.
Send for Circular.



PEERLESS



Damper Regulator.
Superior in every respect to all other regulators. The greatest fuel-saving appliance ever invented. Insures safety from explosion. In ordering mention steam pressure. Illustrated Catalogue sent on application. We set it up and guarantee performance. Price \$75.00.

AMERICAN STEAM APPLIANCE CO.,

Sole Manufacturers,
13 and 15 Park Row, New York.

LITTLE GIANT Wagon Tire Upsetter.



This Machine is strong, durable and cheap, and is superior to all others for upsetting wagon tires on tires and bars of iron without cutting them. It will upset tires one inch at a heat, and is adapted to tires of any size or diameter. Every Blacksmith should have one; they are the best selling machines. Hardware merchants and Agents ever handled. Price only \$12.00. Send for Circular.

LITTLE GIANT MFG. CO.,
Millport, Chemung Co., N. Y.



HAWES' STEAM TRAP.

We guarantee this trap to work perfectly satisfactorily. Order one; if not satisfied, return at our expense. The monthly saving in fuel is more than cost of trap. Send for circular. Price from \$5 to \$15.

WELCH & LAWSON,
176 Centre St.,
New York.

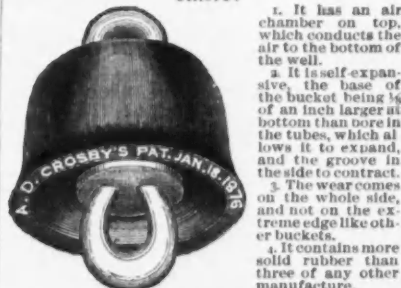
FARLEY'S PATENT Rubber-Cushioned Casting Brush.



Superior to any in the Market.
Manufactured and for sale in the
L. B. FLANDERS MACHINE WORKS,
1095 Hamilton St., Philadelphia
Descriptive Circular on application.

The Most Durable and Best Selling Bucket for Chain Pumps.

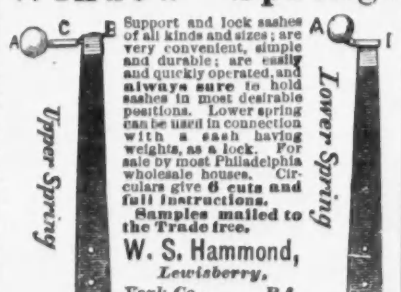
It has no valves to become obstructed and no screw joints to become immovable by rust. Advantages of the Crosby Bucket over all others:



1. It has an air chamber on top, which conducts the air to the bottom of the well.
2. It is self-expansive, the base of the bucket being 1/4 of an inch larger at bottom than top in the tubes, which allows it to expand, and the groove in the side to contract.
3. The wear comes on the whole side, and not on the extreme edge like other buckets.
4. It contains more solid rubber than three of any other manufacture.

No charge for territorial rights. Send for Price List. Agents wanted in every county. Address
A. D. CROSBY, Patentee and General Agent,
Cuba, Allegany Co., New York.

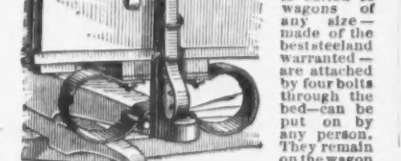
HAMMOND'S Window Springs



Support and look sashes of all kinds and sizes; are very convenient, simple and durable; are easily and quickly operated, and always sure to hold sashes in most desirable position. Lower spring can be used in connection with a sash having weights, as a lock. For sale by most Philadelphia wholesale houses. Circulars give full and full instructions. Samples mailed to the Trade free.

W. S. HAMMOND,
Levittown, Pa.
York Co., Pa.

SOMETHING NEW! PULLIAM'S PATENT BOLSTER SPRINGS for FARM WAGONS.



This valuable device is suited to wagons of any size made of the best steel and warranted—attached by four bolts through the bed—can be put on by any person. They remain on the wagon for all uses and work equally well whether with empty or loaded wagon. There is no use for a spring seat—they make a comfortable spring wagon out of a farm wagon—and save largely in wear and tear. We want Agents everywhere. Send for description and prices, and mention this paper.

SEMPLE & BIRGE MFG. CO., St. Louis, Mo.
S. L. ALLEN & CO., Philadelphia, Pa., Agents.

GEORGE W. BRUCE.

1 Platt Street, New York.

Maynard's Planters', Yankee, Hilling and Bog Hoes, also Brades', Elwell's and others. An unrivalled assortment.

SAXTON & PENNELL: RAILROAD SUPPLIES

EXPORT & COMMISSION MERCHANTS
No 91 WILLIAM ST. N.Y.

A. B. GUNNISON, MANUFACTURER OF

WOOD PUMPS

ESTABLISHED, - 1856.
Warranted Genuine
Cucumber Pumps & Pips. Also Poplar Pumps, Lined Pumps, &c.
The Trade Supplied by
H. B. GRIFFING,
60 Cortlandt St., N. Y.
P. MANN, Washington, D. C.
KIRK & DICKSON
New Castle,
KNECHT & THOMAS,
Winchester, Ind.
—AND BY—
A. B. GUNNISON
Manufacturer,
ERIE, PA.

THE UNIVERSAL LIFTING JACK,

For lifting carriages, wagons, heavy loaded teams, fire engines, railway cars, &c. Four sizes, with patent rubber cushions; will not mar the finest painted carriage.
DINSMORE MFG. CO.,
235 Washington St.,
BOSTON.

Silver medal awarded by Massachusetts Mechanic Charitable Association.
FOR SALE BY
SARGENT & CO., 37 Chambers St., New York.
MACOMBER, BIGELOW & DOUSE, 156 Oliver St., Boston.

AN ENTIRE NEW MAKE OF MINE LAMP.



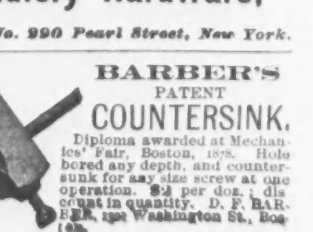
THREE DIFFERENT SIZE SPOUTS
SEND 15 CENTS FOR SAMPLE TO
LEONARD BROTHERS,
SCRANTON, PA.

W. & J. TIEBOUT,

Manufacturers of
Brass, Galvanized & Ship Chandlery Hardware,
No. 990 Pearl Street, New York.

BARBER'S PATENT COUNTERSINK.

Diploma awarded at Mechanics' Fair, Boston, 1878. Hole bored any depth, and countersink for any size screw at one operation. \$2 per doz.; discount in quantity. D. F. BARBER, 235 Washington St., Boston.



New York Wholesale Prices, March 31, 1880.

HARDWARE.

[illegible][illegible]

Carlin's Pens.—Silvered Glass	.....	net
White Enamel	.....	net
Cutlery.		
Meriden Cutlery Co. (Table)	.....	net
Am. Miller Bro.'s Cutlery Co.	.....	dis 25
Hamson & Beckley, Pocket	.....	dis 30
W. F. Rogers & Son, A. A.	.....	dis 40
Wm. Cutler Co.	.....	dis 25
Aaron Burkinshaw's Pocket	.....	dis 25
Dog Collars.		
Embossed Gilt	.....	dis 30
Leather	.....	dis 30
Brass	.....	dis 25
Tray Springs.		
Torrey's	.....	W dis \$2.84 net
Gray's	.....	W dis \$2.82, net
Beed Ro.	.....	W dis \$2.25, net
Gem (Coll)—		
No. 1, Large, Japanese	.....	W dis \$3.50
No. 2, Medium	.....	W dis 2.50
No. 3, Small	.....	W dis 2.00
Challenge (Coll)—		
Nos. 9	7	6
Japanese	.....	W dis \$2.00 2.50 3.50
Wm. Cutler Co.	.....	W dis 4.00 5.00 6.00
Galvanized	.....	W dis 3.50 4.00 4.50
Nickel	.....	W dis 5.50 6.00 7.00
French (Coll)—		
Japanese	.....	W dis \$7.50 6.25 5.00
Nickel	.....	W dis 1.50 2.00 3.00
Steel	.....	W dis 1.00 1.50 2.00
No. 4, "Snook Fly" Screen door size	.....	W dis \$1.75
No. 5, Screen Door Size	.....	W dis \$2.00
No. 6, "Snook Fly" Screen Door Size	.....	W dis 2.50
No. 7, Large	.....	W dis 3.00
Sabina's Lever, No. 1, \$1.2	\$1.50	\$2.4
Sabina's Lever, No. 2, \$1.50	\$2.00	\$3.00
Sabina's Lever, No. 3, \$2.00	\$2.50	\$3.50
Sabina's Lever, No. 4, \$2.50	\$3.00	\$4.00
Sabina's Lever, No. 5, \$3.00	\$3.50	\$4.50
Sabina's Lever, No. 6, \$3.50	\$4.00	\$5.00
Sabina's Lever, No. 7, \$4.00	\$4.50	\$5.50
Sabina's Lever, No. 8, \$4.50	\$5.00	\$6.00
Sabina's Lever, No. 9, \$5.00	\$5.50	\$6.50
Sabina's Lever, No. 10, \$5.50	\$6.00	\$7.00
Sabina's Lever, No. 11, \$6.00	\$6.50	\$7.50
Sabina's Lever, No. 12, \$6.50	\$7.00	\$8.00
Sabina's Lever, No. 13, \$7.00	\$7.50	\$8.50
Sabina's Lever, No. 14, \$7.50	\$8.00	\$9.00
Sabina's Lever, No. 15, \$8.00	\$8.50	\$9.50
Sabina's Lever, No. 16, \$8.50	\$9.00	\$10.00
Sabina's Lever, No. 17, \$9.00	\$9.50	\$10.50
Sabina's Lever, No. 18, \$9.50	\$10.00	\$11.00
Sabina's Lever, No. 19, \$10.00	\$10.50	\$11.50
Sabina's Lever, No. 20, \$10.50	\$11.00	\$12.00
Sabina's Lever, No. 21, \$11.00	\$11.50	\$12.50
Sabina's Lever, No. 22, \$11.50	\$12.00	\$13.00
Sabina's Lever, No. 23, \$12.00	\$12.50	\$13.50
Sabina's Lever, No. 24, \$12.50	\$13.00	\$14.00
Sabina's Lever, No. 25, \$13.00	\$13.50	\$14.50
Sabina's Lever, No. 26, \$13.50	\$14.00	\$15.00
Sabina's Lever, No. 27, \$14.00	\$14.50	\$15.50
Sabina's Lever, No. 28, \$14.50	\$15.00	\$16.00
Sabina's Lever, No. 29, \$15.00	\$15.50	\$16.50
Sabina's Lever, No. 30, \$15.50	\$16.00	\$17.00
Sabina's Lever, No. 31, \$16.00	\$16.50	\$17.50
Sabina's Lever, No. 32, \$16.50	\$17.00	\$18.00
Sabina's Lever, No. 33, \$17.00	\$17.50	\$18.50
Sabina's Lever, No. 34, \$17.50	\$18.00	\$19.00
Sabina's Lever, No. 35, \$18.00	\$18.50	\$19.50
Sabina's Lever, No. 36, \$18.50	\$19.00	\$20.00
Sabina's Lever, No. 37, \$19.00	\$19.50	\$20.50
Sabina's Lever, No. 38, \$19.50	\$20.00	\$21.00
Sabina's Lever, No. 39, \$20.00	\$20.50	\$21.50
Sabina's Lever, No. 40, \$20.50	\$21.00	\$22.00
Sabina's Lever, No. 41, \$21.00	\$21.50	\$22.50
Sabina's Lever, No. 42, \$21.50	\$22.00	\$23.00
Sabina's Lever, No. 43, \$22.00	\$22.50	\$23.50
Sabina's Lever, No. 44, \$22.50	\$23.00	\$24.00
Sabina's Lever, No. 45, \$23.00	\$23.50	\$24.50
Sabina's Lever, No. 46, \$23.50	\$24.00	\$25.00
Sabina's Lever, No. 47, \$24.00	\$24.50	\$25.50
Sabina's Lever, No. 48, \$24.50	\$25.00	\$26.00
Sabina's Lever, No. 49, \$25.00	\$25.50	\$26.50
Sabina's Lever, No. 50, \$25.50	\$26.00	\$27.00
Sabina's Lever, No. 51, \$26.00	\$26.50	\$27.50
Sabina's Lever, No. 52, \$26.50	\$27.00	\$28.00
Sabina's Lever, No. 53, \$27.00	\$27.50	\$28.50
Sabina's Lever, No. 54, \$27.50	\$28.00	\$29.00
Sabina's Lever, No. 55, \$28.00	\$28.50	\$29.50
Sabina's Lever, No. 56, \$28.50	\$29.00	\$30.00
Sabina's Lever, No. 57, \$29.00	\$29.50	\$30.50
Sabina's Lever, No. 58, \$29.50	\$30.00	\$31.00
Sabina's Lever, No. 59, \$30.00	\$30.50	\$31.50
Sabina's Lever, No. 60, \$30.50	\$31.00	\$32.00
Sabina's Lever, No. 61, \$31.00	\$31.50	\$32.50
Sabina's Lever, No. 62, \$31.50	\$32.00	\$33.00
Sabina's Lever, No. 63, \$32.00	\$32.50	\$33.50
Sabina's Lever, No. 64, \$32.50	\$33.00	\$34.00
Sabina's Lever, No. 65, \$33.00	\$33.50	\$34.50
Sabina's Lever, No. 66, \$33.50	\$34.00	\$35.00
Sabina's Lever, No. 67, \$34.00	\$34.50	\$35.50
Sabina's Lever, No. 68, \$34.50	\$35.00	\$36.00
Sabina's Lever, No. 69, \$35.00	\$35.50	\$36.50
Sabina's Lever, No. 70, \$35.50	\$36.00	\$37.00
Sabina's Lever, No. 71, \$36.00	\$36.50	\$37.50
Sabina's Lever, No. 72, \$36.50	\$37.00	\$38.00
Sabina's Lever, No. 73, \$37.00	\$37.50	\$38.50
Sabina's Lever, No. 74, \$37.50	\$38.00	\$39.00
Sabina's Lever, No. 75, \$38.00	\$38.50	\$39.50
Sabina's Lever, No. 76, \$38.50	\$39.00	\$40.00
Sabina's Lever, No. 77, \$39.00	\$39.50	\$40.50
Sabina's Lever, No. 78, \$39.50	\$40.00	\$41.00
Sabina's Lever, No. 79, \$40.00	\$40.50	\$41.50
Sabina's Lever, No. 80, \$40.50	\$41.00	\$42.00
Sabina's Lever, No. 81, \$41.00	\$41.50	\$42.50
Sabina's Lever, No. 82, \$41.50	\$42.00	\$43.00
Sabina's Lever, No. 83, \$42.00	\$42.50	\$43.50
Sabina's Lever, No. 84, \$42.50	\$43.00	\$44.00
Sabina's Lever, No. 85, \$43.00	\$43.50	\$44.50
Sabina's Lever, No. 86, \$43.50	\$44.00	\$45.00
Sabina's Lever, No. 87, \$44.00	\$44.50	\$45.50
Sabina's Lever, No. 88, \$44.50	\$45.00	\$46.00
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Sabina's Lever, No. 91, \$46.00	\$46.50	\$47.50
Sabina's Lever, No. 92, \$46.50	\$47.00	\$48.00
Sabina's Lever, No. 93, \$47.00	\$47.50	\$48.50
Sabina's Lever, No. 94, \$47.50	\$48.00	\$49.00
Sabina's Lever, No. 95, \$48.00	\$48.50	\$49.50
Sabina's Lever, No. 96, \$48.50	\$49.00	\$50.00
Sabina's Lever, No. 97, \$49.00	\$49.50	\$50.50
Sabina's Lever, No. 98, \$49.50	\$50.00	\$51.00
Sabina's Lever, No. 99, \$50.00	\$50.50	\$51.50
Sabina's Lever, No. 100, \$50.50	\$51.00	\$52.00
Sabina's Lever, No. 101, \$51.00	\$51.50	\$52.50
Sabina's Lever, No. 102, \$51.50	\$52.00	\$53.00
Sabina's Lever, No. 103, \$52.00	\$52.50	\$53.50
Sabina's Lever, No. 104, \$52.50	\$53.00	\$54.00
Sabina's Lever, No. 105, \$53.00	\$53.50	\$54.50
Sabina's Lever, No. 106, \$53.50	\$54.00	\$55.00
Sabina's Lever, No. 107, \$54.00	\$54.50	\$55.50
Sabina's Lever, No. 108, \$54.50	\$55.00	\$56.00
Sabina's Lever, No. 109, \$55.00	\$55.50	\$56.50
Sabina's Lever, No. 110, \$55.50	\$56.00	\$57.00
Sabina's Lever, No. 111, \$56.00	\$56.50	\$57.50
Sabina's Lever, No. 112, \$56.50	\$57.00	\$58.00
Sabina's Lever, No. 113, \$57.00	\$57.50	\$58.50
Sabina's Lever, No. 114, \$57.50	\$58.00	\$59.00
Sabina's Lever, No. 115, \$58.00	\$58.50	\$59.50
Sabina's Lever, No. 116, \$58.50	\$59.00	\$60.00
Sabina's Lever, No. 117, \$59.00	\$59.50	\$60.50
Sabina's Lever, No. 118, \$59.50	\$60.00	\$61.00
Sabina's Lever, No. 119, \$60.00	\$60.50	\$61.50
Sabina's Lever, No. 120, \$60.50	\$61.00	\$62.00
Sabina's Lever, No. 121, \$61.00	\$61.50	\$62.50
Sabina's Lever, No. 122, \$61.50	\$62.00	\$63.00
Sabina's Lever, No. 123, \$62.00	\$62.50	\$63.50
Sabina's Lever, No. 124, \$62.50	\$63.00	\$64.00
Sabina's Lever, No. 125, \$63.00	\$63.50	\$64.50
Sabina's Lever, No. 126, \$63.50	\$64.00	\$65.00
Sabina's Lever, No. 127, \$64.00	\$64.50	\$65.50
Sabina's Lever, No. 128, \$64.50	\$65.00	\$66.00
Sabina's Lever, No. 129, \$65.00	\$65.50	\$66.50
Sabina's Lever, No. 130, \$65.50	\$66.00	\$67.00
Sabina's Lever, No. 131, \$66.00	\$66.50	\$67.50
Sabina's Lever, No. 132, \$66.50	\$67.00	\$68.00
Sabina's Lever, No. 133, \$67.00	\$67.50	\$68.50
Sabina's Lever, No. 134, \$67.50	\$68.00	\$69.00
Sabina's Lever, No. 135, \$68.00	\$68.50	\$69.50
Sabina's Lever, No. 136, \$68.50	\$69.00	\$70.00
Sabina's Lever, No. 137, \$69.00	\$69.50	\$70.50
Sabina's Lever, No. 138, \$69.50	\$70.00	\$71.00
Sabina's Lever, No. 139, \$70.00	\$70.50	\$71.50
Sabina's Lever, No. 140, \$70.50	\$71.00	\$72.00
Sabina's Lever, No. 141, \$71.00	\$71.50	\$72.50
Sabina's Lever, No. 142, \$71.50	\$72.00	\$73.00
Sabina's Lever, No. 143, \$72.00	\$72.50	\$73.50
Sabina's Lever, No. 144, \$72.50	\$73.00	\$74.00
Sabina's Lever, No. 145, \$73.00	\$73.50	\$74.50
Sabina's Lever, No. 146, \$73.50	\$74.00	\$75.00
Sabina's Lever, No. 147, \$74.00	\$74.50	\$75.50
Sabina's Lever, No. 148, \$74.50	\$75.00	\$76.00
Sabina's Lever, No. 149, \$75.00	\$75.50	\$76.50
Sabina's Lever, No. 150, \$75.50	\$76.00	\$77.00
Sabina's Lever, No. 151, \$76.00	\$76.50	\$77.50
Sabina's Lever, No. 152, \$76.50	\$77.00	\$78.00
Sabina's Lever, No. 153, \$77.00	\$77.50	\$78.50
Sabina's Lever, No. 154, \$77.50	\$78.00	\$79.00
Sabina's Lever, No. 155, \$78.00	\$78.50	\$79.50
Sabina's Lever, No. 156, \$78.50	\$79.00	\$80.00
Sabina's Lever, No. 157, \$79.00	\$79.50	\$80.50
Sabina's Lever, No. 158, \$79.50	\$80.00	\$81.00
Sabina's Lever, No. 159, \$80.00	\$80.50	\$81.50
Sabina's Lever, No. 160, \$80.50	\$81.00	\$82.00
Sabina's Lever, No. 161, \$81.00	\$81.50	\$82.50
Sabina's Lever, No. 162, \$81.50	\$82.00	\$83.00
Sabina's Lever, No. 163, \$82.00	\$82.50	\$83.50
Sabina's Lever, No. 164, \$82.50	\$83.00	\$84.00
Sabina's Lever, No. 165, \$83.00	\$83.50	\$84.50
Sabina's Lever, No. 166, \$83.50	\$84.00	\$85.00
Sabina's Lever, No. 167, \$84.00	\$84.50	\$85.50
Sabina's Lever, No. 168, \$84.50	\$85.00	\$86.00
Sabina's Lever, No. 169, \$85.00	\$85.50	\$86.50
Sabina's Lever, No. 170, \$85.50	\$86.00	\$87.00
Sabina's Lever, No. 171, \$86.00	\$86.50	\$87.50
Sabina's Lever, No. 172, \$86.50	\$87.00	\$88.00
Sabina's Lever, No. 173, \$87.00	\$87.50	\$88.50
Sabina's Lever, No. 174, \$87.50	\$88.00	\$89.00
Sabina's Lever, No. 175, \$88.00	\$88.50	\$89.50
Sabina's Lever, No. 176, \$88.50	\$89.00	\$90.00
Sabina's Lever, No. 177, \$89.00	\$89.50	\$90.50
Sabina's Lever, No. 178, \$89.50	\$90.00	\$91.00
Sabina's Lever, No. 179, \$90.00	\$90.50	\$91.50
Sabina's Lever, No. 180, \$90.50	\$91.00	\$92.00
Sabina's Lever, No. 181, \$91.00	\$91.50	\$92.50
Sabina's Lever, No. 182, \$91.50	\$92.00	\$93.00
Sabina's Lever, No. 183, \$92.00	\$92.50	\$93.50
Sabina's Lever, No. 184, \$92.50	\$93.00	\$94.00
Sabina's Lever, No. 185, \$93.00	\$93.50	\$94.50
Sabina's Lever, No. 186, \$93.50	\$94.00	\$95.00
Sabina's Lever, No. 187, \$94.00	\$94.50	\$95.50
Sabina's Lever, No. 188, \$94.50	\$95.00	\$96.00
Sabina's Lever, No. 189, \$95.00	\$95.50	\$96.50
Sabina's Lever, No. 190, \$95.50	\$96.00	\$97.00
Sabina's Lever, No. 191, \$96.00	\$96.50	\$97.50
Sabina's Lever, No. 192, \$96.50	\$97.00	\$98.00
Sabina's Lever, No. 193, \$97.00	\$97.50	\$98.50
Sabina's Lever, No. 194, \$97.50	\$98.00	\$99.00
Sabina's Lever, No. 195, \$98.00	\$98.50	\$99.50
Sabina's Lever, No. 196, \$98.50	\$99.00	\$100.00
Sabina's Lever, No. 197, \$99.00	\$99.50	\$100.50
Sabina's Lever, No. 198, \$99.50	\$100.00	\$101.00
Sabina's Lever, No. 199, \$100.00	\$100.50	\$101.50
Sabina's Lever, No. 200, \$100.50	\$101.00	\$102.00
Sabina's Lever, No. 201, \$101.00	\$101.50	\$102.50
Sabina's Lever, No. 202, \$101.50	\$102.00	\$103.00
Sabina's Lever, No. 203, \$102.00	\$102.50	\$103.50
Sabina's Lever, No. 204, \$102.50	\$103.00	\$104.00
Sabina's Lever, No. 205, \$103.00	\$103.50	\$104.50
Sabina's Lever, No. 206, \$103.50	\$104.00	\$105.00
Sabina's Lever, No. 207, \$104.00	\$104.50	\$105.50
Sabina's Lever, No. 208, \$104.50	\$105.00	\$106.00
Sabina's Lever, No. 209, \$105.00	\$105.50	\$106.50
Sabina's Lever, No. 210, \$105.50	\$106.00	\$107.00
Sabina's Lever, No. 211, \$106.00	\$106.50	\$107.50
Sabina's Lever, No. 212, \$106.50	\$107.00	\$108.00
Sabina's Lever, No. 213, \$107.00	\$107.50	\$108.50
Sabina's Lever, No. 214, \$107.50	\$108.00	\$109.00
Sabina's Lever, No. 215, \$108.00	\$108.50	\$109.50
Sabina's Lever, No. 216, \$108.50	\$109.00	\$110.00
Sabina's Lever, No. 217, \$109.00	\$109.50	\$110.50
Sabina's Lever, No. 218, \$109.50	\$110.00	\$111.00
Sabina's Lever, No. 219, \$110.00	\$110.50	\$111.50
Sabina's Lever, No. 220, \$110.50	\$111.00	\$112.00
Sabina's Lever, No. 221, \$111.00	\$111.50	\$112.50
Sabina's Lever, No. 222, \$111.50	\$112.00	\$113.00
Sabina's Lever, No. 223, \$112.00	\$112.50	\$113.50
Sabina's Lever, No. 224, \$112.50	\$113.00	\$114.00
Sabina's Lever, No. 225, \$113.00	\$113.50	\$114.50
Sabina's Lever, No. 226, \$113.50	\$114.00	\$115.00
Sabina's Lever, No. 227, \$114.00	\$114.50	\$115.50
Sabina's Lever, No. 228, \$114.50	\$115.00	\$116.00
Sabina's Lever, No. 229, \$115.00	\$115.50	\$116.50
Sabina's Lever, No. 230, \$115.50	\$116.00	\$117.00
Sabina's Lever, No. 231, \$116.00	\$116.50	\$117.50
Sabina's Lever, No. 232, \$116.50	\$117.00	\$118.00
Sabina's Lever, No. 233, \$117.00	\$117.50	\$118.50
Sabina's Lever, No. 234, \$117.50	\$118.00	\$119.00
Sabina's Lever, No. 235, \$118.00	\$118.50	\$119.50
Sabina's Lever, No. 236, \$118.50	\$119.00	\$120.00
Sabina's Lever, No. 237, \$119.00	\$119.50	\$120.50
Sabina's Lever, No. 238, \$119.50	\$120.00	\$121.00
Sabina's Lever, No. 239, \$120.00	\$120.50	\$121.50
Sabina's Lever, No. 240, \$120.50	\$121.00	\$122.00
Sabina's Lever, No. 241, \$121.00	\$121.50	

[illegible][illegible]

Punches.	
Self or Drive	W. do. \$2.00; 2 1/2, 4.00; 3, 4.50; 4, 5.00; 5, 5.50; 6, 6.00; 7, 6.50; 8, 7.00; 9, 7.50; 10, 8.00; 11, 8.50; 12, 9.00; 13, 9.50; 14, 10.00; 15, 10.50; 16, 11.00; 17, 11.50; 18, 12.00; 19, 12.50; 20, 13.00; 21, 13.50; 22, 14.00; 23, 14.50; 24, 15.00; 25, 15.50; 26, 16.00; 27, 16.50; 28, 17.00; 29, 17.50; 30, 18.00; 31, 18.50; 32, 19.00; 33, 19.50; 34, 20.00; 35, 20.50; 36, 21.00; 37, 21.50; 38, 22.00; 39, 22.50; 40, 23.00; 41, 23.50; 42, 24.00; 43, 24.50; 44, 25.00; 45, 25.50; 46, 26.00; 47, 26.50; 48, 27.00; 49, 27.50; 50, 28.00; 51, 28.50; 52, 29.00; 53, 29.50; 54, 30.00; 55, 30.50; 56, 31.00; 57, 31.50; 58, 32.00; 59, 32.50; 60, 33.00; 61, 33.50; 62, 34.00; 63, 34.50; 64, 35.00; 65, 35.50; 66, 36.00; 67, 36.50; 68, 37.00; 69, 37.50; 70, 38.00; 71, 38.50; 72, 39.00; 73, 39.50; 74, 40.00; 75, 40.50; 76, 41.00; 77, 41.50; 78, 42.00; 79, 42.50; 80, 43.00; 81, 43.50; 82, 44.00; 83, 44.50; 84, 45.00; 85, 45.50; 86, 46.00; 87, 46.50; 88, 47.00; 89, 47.50; 90, 48.00; 91, 48.50; 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948, 477.00; 949, 477.50; 950, 478.00; 951, 478.50; 952, 479.00; 953, 479.50; 954, 480.00; 955, 480.50; 956, 481.00; 957, 481.50; 958, 482.00; 959, 482.50; 960, 48

Steel.

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 Particular attention is paid to quality and temper for FILES, SAWS, EDGE TOOLS,
 TABLE and POCKET CUTLERY, TOOLS, TAPS and DIES; also for COLD ROLLED STEEL for
 CLOCK SPRINGS, CORSET CLASPS, &c.
 A Large Assorted Stock of JOHN ROTHERY'S FILES always on hand.

Steel.

NEWARK STEEL WORKS.
BENJAMIN ATHA & CO.,
 Manufacturers of
BEST REFINED CAST STEEL
 And grades of Steel specially adapted for Lathe Tools, Chisels and Taps and Dies.
 Warranted most superior for TOOLS AND GRANITE ROCK DRILLS.
 A full assortment of this universally approved OLD BRAND and other Steels for sale by
EDWARD FRITH & SON, Agents,
 No. 241 Pearl St., New York.

LABELLE STEEL WORKS.
SMITH, SUTTON & CO.,
 MANUFACTURERS OF ALL KINDS OF
STEEL.
 Also Springs, Axles, Rake Teeth, &c.
 OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.
 Post Office Address, Pittsburgh, Pa.
 Represented at Boston by WETHERELL BROS., 21 Oliver St.; at Milwaukee by JOHN FRITZLAFF, 43 to 49 West
 Water St.; at Chicago by S. D. KIMBARK, 10 to 14 Michigan Ave.

ALBANY & RENSSELAER IRON & STEEL CO.,
 Troy, N. Y.,
 Office in New York City, 56 BROADWAY.
Bessemer Railway Steel,
 MERCHANT BARS, TIRE AND SHAFTING.
 Railroad Iron, Pig Iron, Merchant and Ship Iron.
 AGENCIES IN BOSTON AND PHILADELPHIA.

FRANCIS HOBSON & SON,
 97 John Street, NEW YORK,
 Sole Manufact'rs of "CHOICE" Extra Cast Steel.
 Manufacturers of all Descriptions of Steel.
 Manufacturers of Every Kind of Steel Wire.
 Don Works, Sheffield, England.
 CHAS. HUGILL, Agent.

COCKER BROTHERS,
 (LIMITED)
 Successors to SAM'L COCKER & SON,
 ESTABLISHED 1752,

SOLE MANUFACTURERS OF THE
EXTRA
CAST STEEL of Every Description.
 WIRE in rings and lengths for every purpose.
 WIRE PLATES from our PATENT METEOR STEEL.
 SHEETS of any gauge and quality.

The public are requested to see that our registered Labels and Trade Mark are on all
 goods to insure their being genuine.
 We maintain that, considering the high class quality of our goods, they are the
 cheapest in the market; therefore, Importers should apply direct to insure
 our best terms.

NAVIGATION STEEL WORKS
 AND

NURSERY WIRE & ROLLING MILLS,
 SHEFFIELD, ENGLAND.

FOREST CITY STEEL CO.,
 Manufacturers of Best Quality
 Crucible Steel for Drills, Taps, Dies, Tools, Mill Picks, &c.
 Testimonial of D. J. Jones, Roll Turner, Cleveland Rolling Mill Co.
 "I have been testing the steel on chilled iron rolls along with the best English and American steels,
 and find it superior to any of them in every respect."
 Samples furnished for trial. Quality guaranteed equal to any.
 No. 13 Detroit Street, Cleveland, Ohio.

STEEL Gautier Steel.
 See Page 3.

Steel.

R. MUSHET'S
Special Steel
 FOR
LATHES, PLANERS, &c.
 Turns out at least double work by increased speed
 and feed, and cuts harder metals than any other
 steel. Neither hardening nor tempering required.
 Sole Makers,
SAMUEL OSBORN & CO.,
 Sheffield, England.
 Represented in the United States by
RANDALL & JONES,
 10 Oliver Street, BOSTON.

STEELINE.

Used for refining and temper-
 ing all kinds of Steel Tools.
 Increases their durability at
 least fivefold.
 Secures absolute safety from
 cracking.
 Send for circular to
BAUER & CO.,
 96 Greenwich Ave., N. Y.

Emery, Grindstones, &c.

Walter R. Wood,
GRINDSTONES.
 Berea, O., Nova Scotia, & other brands
 283 and 285 Front Street, New York.

WORTHINGTON & SONS,
 North Amherst, Ohio.
 Manufacturers of

Lake Huron Amherst
and Berea

GRINDSTONES.

BOYD & CHASE

The largest manufacturers in the world of
OIL STONE
 Of all description.
 107th Street and Harlem River,
 Send for Illustrated Price List. NEW YORK.

ASHLAND EMERY CO.
 CHARLES ALDEN, MANAGER.
 Importers and Manufacturers of FINE
TURKISH EMERY
 A. A. IRVINE & CO., Agents,
 14 MURRAY ST., NEW YORK.
 Send for quotations and samples.

H. S. WOOD & CO.,
 Manufacturers of
 Berea, O., Black River, O., Lake Huron, Mich.,
 Importers of
 Newcastle, Eng., Wickersley, Eng.,
 Nova Scotia,

GRINDSTONES
 33 West & 58 Washington Sts., N. Y.

P. L. WEIMER'S
BLAST FURNACE
ENGINEERING WORKS.

Specialty: Blast Furnace Erection,
 Rebuilding and Repairs.
 Plans and Specifications prepared for
 Anthracite, Coke or Char-
 coal Furnaces.

Contracts made or placed for new plants and re-
 pairs, or for modernizing works now in place
 Moving Engines, Hot-Blast Stoves and Furnace
 Fixtures of new and improved designs made to
 order. Address

P. L. WEIMER,
 LEBANON, P.A.,
 Or, 152 South 4th Street, Philadelphia.



Steel.

THE EDGAR THOMSON STEEL CO., LIMITED.

MANUFACTURERS OF



General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.

New York Office, 57 Broadway.

The Company warrants its rails equal in quality to any manufactured in the United States.

Branch Office and P. O. Address, No. 48 Fifth Ave., Pittsburgh, Pa.
 THOS. M. CARNEGIE, Chairman. D. A. STEWART, Sec'y and Treas.

North Chicago Rolling Mill Co.

ESTABLISHED 1857.

CAPITAL, \$3,000,000.

INCORPORATED 1869.

Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

MERCHANT BAR, FISH PLATES, PIG METAL,
 IRON RAILS & BESSEMER STEEL RAILS.

CAPACITY OF WORKS.		
Fish Plates.....	20,000 tons	
Merchant Bar.....	40,000 "	
Pig Metal.....	80,000 "	
Iron Rails.....	80,000 "	
Steel Rails.....	80,000 "	
Total Capacity per year.....	280,000 "	

OFFICES:

17 Metropolitan Block, Chicago, Ill.
 37 Mitchell Block, Milwaukee, Wis.

O. W. POTTER, President, CHICAGO.
 S. P. BURT, Vice-President, NEW BEDFORD.
 S. CLEMENT, Treasurer, MILWAUKEE.
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THE STEEL COMPANY OF SCOTLAND, LIMITED,

(SIEMENS' PROCESS.)

MANUFACTURERS OF

Steel Rails, Steel Ship Plates,
 Steel Blooms for Rails, Steel Boiler Plates,
 Steel Blooms for Wire, Steel Angles,
 Steel Wire Rods, Steel Forgings,
 Steel Locomotive Fire Boxes, Steel Castings.

JAMES LEE & CO.,

Resident Agents for the United States,

72 Pine Street, New York.

MIDVALE STEEL WORKS,

NICETOWN, PHILADELPHIA.

Best Warranted Cast Steel for Machinists' Tools,

Taps, Dies, Punches, Shear Blades, Chipping Chisels and Granite Rock Drills,

Extra Mild Center Steel, special for Taps,

MACHINERY AND CAST SPRING STEEL, HEAVY AND LIGHT FORGINGS.

Warehouse, No. 12 North 5th St., Philadelphia.

Address A. M. F. Watson, General Sales Agent.

PYROLUSITE MANGANESE COMPANY,

MINERS, DEALERS AND EXPORTERS OF HIGH TEST

Crystallized Black Oxide of

Manganese

IN CRUDE STATE.

Suitable for the manufacture of Ferro-Manganese, Spiegeleisen, Bessemer Pig, &c. Also, fine ground and granulated, especially prepared for

STEEL, GLASS, PAINT, VARNISH and DRYER MAKERS, OIL BOILERS, &c.

MANUFACTURERS OF SUPERFINE FLOATED

Standard Barytes, Gritless Ochre, Borate of Manganese, &c.

Office, 54 Cliff Street, New York.

Philadelphia Smelting Co.,

S. E. Cor. Twelfth and Noble Sts., PHILADELPHIA.

GENUINE BABBITT,

Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.

DEOXIDIZED BRONZE,

Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.

PHILADELPHIA, October 4, 1879.

"Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we take pleasure in recommending it as being superior to any we have heretofore used.
 Very truly,
 HENRY DISSTON & SONS.

C. P. MOORMAN, Prest. J. MORGAN COLEMAN, V. Prest. L. G. QUIGLEY, Sec. and Treas.

COLEMAN ROLLING MILL CO.,

Lessees Louisville Rolling Mill,

MANUFACTURERS OF

BAR, BAND & SHEET IRON

T and Tram Railroad Iron, 10 lbs. to 40 lbs. per yard, and

DEAN & COLEMAN PATENT RAIL.

Office, No. 45 W. Main St., Mill Brook St., LOUISVILLE, KY.

WIRE NAILS

French Points, Window Shade Nails,
 Upholstering, **WAGON NAILS**, Molding Nails

(Sample Cards sent on application.)

Electrotype, Roofing Nails,
 Barbed Caster Nails.

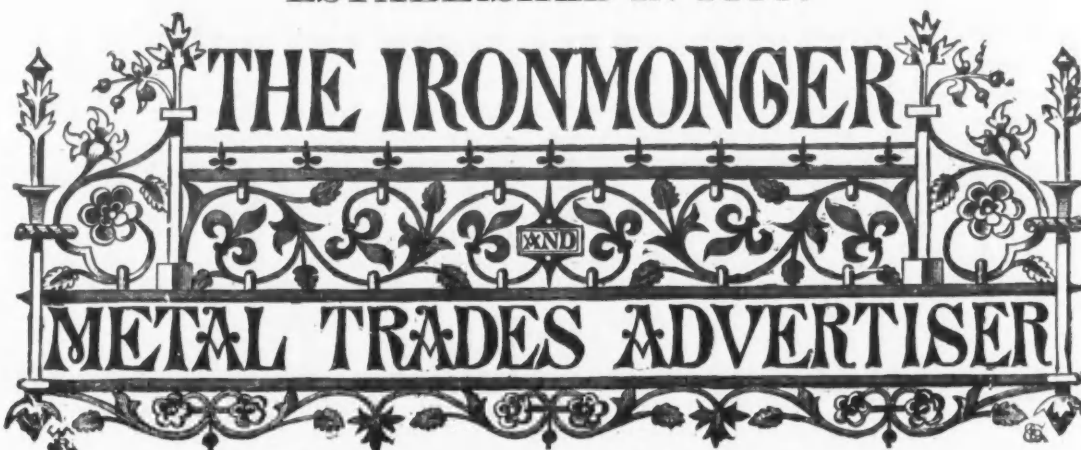
Veneer Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Lock Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. packages, papers, or as wanted.

AMERICAN WIRE NAIL CO.

Factory, Fifteenth and Madison Sts.

COVINGTON, KY.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:

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SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. The *Week*, *Legal News*, *Trade Notes*, *Bankruptcies*, *Foreign Notes*, *Colonial Settings*, *Merchants' Circulars*, &c., are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

to the *Ironmonger* and *Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

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In the spring and autumn of each year there is published a Special Issue, the circulation of which is not less than Twelve Thousand (12,000) copies

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual presented free to every subscriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT

Is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:

APRIL 3, MAY 1 and 29, JUNE 26, JULY 24, AUGUST 21, SEPTEMBER 18, OCTOBER 16, NOVEMBER 13, DECEMBER 11, JANUARY 8, 1881, FEBRUARY 5, MARCH 5.

This Supplement is published in

FIVE LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach, but in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE,

so far as its experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.

B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.
Established 1843.
Office, foot of Houston Street, East River,
NEW YORK.

NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.

M. D. Valentine & Bro

Manufacturers of

FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

BORGNER & O'BRIEN,

Manufacturers

FIRE BRICK

Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.,
Twenty-third Street,
Above Race, PHILADELPHIA.
Twenty years' practical Experience.

PERTH AMBOY TERRA COTTA CO.,

Successors to

A. HALL & SONS, Perth Amboy, N. J.,
ARCHITECTURAL TERRA COTTA

FIRE BRICK.
170 Broadway, NEW YORK.

Brooklyn Clay Retort

AND
FIRE BRICK WORKS.

Manufacturers of Clay Retorts, Fire Brick, Gas
House and other Tile, Cupola Brick, &c. Dealers in
and Miners of Fire Clay and Fire Sand. Clay bank at
Burt's Creek, New Jersey. Manufacture: Van Dyke,
Elizabeth, Richards and Partition Sts., Brooklyn, N. Y.
Office: No. 25 Van Dyke St.

Watson Fire Brick Manufactory,

ESTABLISHED 1836.

JOHN B. WATSON, Perth Amboy, New Jersey.
Manufacturer of

FIRE BRICK,

For Rolling Mills, Blast Furnaces, Foundries,
Gas Works, Lime Kilns, Tanneries, Boiler
and Grate Setting, Glass Works, &c.
Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,

Proprietor of the

Excelsior Fire Brick & Clay

Retort Works.

Manufacturer of FIRE BRICK, HOLLOW
BRICK AND CLAY RETORTS.
WORKS: PERTH AMBOY, NEW JERSEY.
Office & Depot, 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,

Troy, N. Y.,

JAMES OSTRANDER & SON,
ESTABLISHED 1848,
Manufacturers of

FIRE BRICK,

Tuyeres, Tiles, Blast Furnace Blocks, &c. Miners and
Dealers in Woodbridge Fire Clay and Sand, and Staten
Island Kaolin.

Established 1864.

GARDNER BROTHERS,

Manufacturers of

STANDARD SAVAGE FIRE BRICK,
TILE & FURNACE BLOCKS,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and
Miners and Shippers of Fire Clay.
OFFICE: 116 Smithfield St., Pittsburgh, Pa.
WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS,

FIRE BRICK,

Buffalo, N. Y.

MILLER'S BRICK PRESSES

(Established 1844).

FIRE and RED BRICK,

And Brickmakers' Tools in General.
AML. P. MILLER & SON,
209 South 5th St., Philadelphia.

RUDOLPH FRANK,
Office, 229 FULTON STREET,
NEW YORK.

ALUMINA and
SILICA

FIRE BRICKS

Works,
BROOKLYN, on
the East River,
Through Cars, Canal Boats
and Vessels loaded direct from the
Works to all points.

DUK'S IMPROVED ELEVATOR BUCKET.



ALWAYS FIRST PREMIUM.

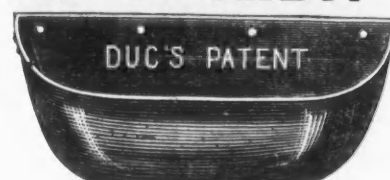
NO CORNERS TO CATCH.
THROWS FREE AND CLEAR.
200,000 IN USE.

Send for Circular.

THE BEST FOR MILLS.
THE BEST FOR BREWERS.
THE BEST FOR MALTSTERS
THE BEST FOR MINERS.



MILL BUCKET.
In 3/4 in. to 10 in.



THE STOREHOUSE BUCKET.

(Partial straight front.)

In 12 in., 14 in., 16 in. and 17 in. Sizes.

Very Durable and Strong.

T. F. ROWLAND, Sole Manufacturer,
BROOKLYN, N. Y.

NICHOLSON FILE CO., Manufacturers of FILES AND RASPS.

ALSO

Filers' Tools & Specialties.

Manufactory and Offices at Providence, R. I.

The following space will be used in illustrating our specialties, the matter being changed weekly.

IMPROVED BUTCHERS' STEELS.

Patented December 25th, 1877.



REGULAR STEEL.



PATENT STEEL.

We give herewith an illustration showing two forms of Butchers' Steels—the *Regular* and *Patent Steel*.

In the sharpening of knives two operations are essential: First, that of grinding or otherwise bringing the blade to a thin edge, after which it is to be whetted, or its edge finished down to a proper condition for cutting.

The *Patent Steel*, above illustrated, is designed to perform both of these operations, being provided with two oppositely located cutting or abrasive surfaces, and two oppositely located smooth or finishing surfaces; the object being that the knife may be brought to an edge upon the abrasive surface, and by a slight turn of the wrist the steel changed into such a position that the knife may be brought to bear upon the two finishing surfaces, without further change or trouble on the part of the operator.

In addition to the improved pattern, we make a steel from the same quality of stock, and of the same style of finish, which we call our *Regular Steel*, whose entire surface is *drawfiled* or *stripped*, after the manner of the well-known "Wilson Steel."

The steels are manufactured from a superior quality of stock, made especially for this purpose, and are finished and mounted in a style unequalled in this line of goods; the handles being enameled in imitation of horn, jet and rose-wood. Every steel stamped with our brand is warranted hard and free from flaws.

We are now prepared to furnish the *Regular* or *Patent Steels*, in lengths of 10 or 12 inches, put up in lots of one-half dozen each.

PURE SILICA FIRE BRICK,

MADE BY THE

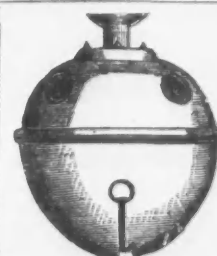
Landore Siemens Company,

Specialty for OPEN-HEARTH FURNACES.

More "heats" obtained from them than from any other Bricks known.

Imported, to order only, by

PHILIP S. JUSTICE, Sole Agent in United States,
14 NORTH FIFTH STREET, PHILADELPHIA.



Established 1838
Bevin Bros. Mfg.
Co.,

Easthampton, Ct.

Manufacturers of

SLEIGH BELLS,

House, Tea, Hand,

Gong Bells, &c.
Bell Metal Kettles.

John T. Lewis & Bros
No. 231 South Front St.,
PHILADELPHIA.



TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS

Brooklyn White Lead Co.



TRADE MARK

White Lead, Red Lead & Litharge.
89 Maiden Lane, NEW YORK.
FISHER HOWE, TREASURER.

JOHN JEWETT & SONS

Manufacturers of the well-known brand of

WHITE LEAD.



182 Front Street, NEW YORK.



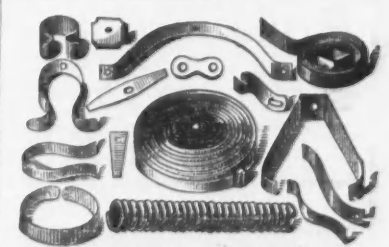
TRADE MARK.

The Atlantic White Lead
and Linseed Oil Co.,

MANUFACTURERS OF

White Lead (Atlantic), Red Lead,
Litharge & Linseed Oil.

ROBERT COLGATE & CO.,
287 Pearl Street, New York



DUNBAR BROS.,

Manufacturers of

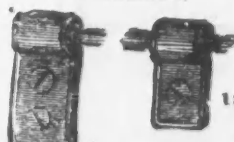
Clock Springs and Small Springs

of every description, from best Cast Steel,
BRISTOL, CONN.

Torrey's Door Springs.

P. R. DUNNE,

Manufacturer,



182 Fulton St.,
NEW YORK.

ORGANS

13 Stops, 1 set Reeds, Stool, Book,
only \$65. Pianos, Organs, Cycles &
Book only \$14.75. Paper free.
D. F. BEATTY, Washington, N. J.

PHILADELPHIA.

(Corrected Weekly by Lloyd, Supple & Walton.)

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Amvils.	Peter Wrights, # 2.	110 net
Over 250 lbs.	115 net	
Eagle (American).	100 net	
Apple Pattern.	100 net	
Reading No. 72.	per doz \$5.00 net	
No. 74.	5.00 net	
No. 76.	5.00 net	
No. 78.	5.00 net	
French Pattern.	150 net	
Little Favorites, corner and silicon.	7.50 net	
Lots of 10 to 25 dozen special price.		
Augers.		
Run's Kentucky and Yankee.	per doz \$11.00	
Mann's Red Warrior.	11.00	
Richard Chief.	10.00	
Bevered Axes.	add 500	
Double Bit Axes.	22.00	
Augers and Auger Bits.—New List January.		
Baker Nut Augers.	dis 40 1/2	
Cook's Augers.	dis 40 1/2	
Watrous' Ship Augers.	dis 15 1/2	
Benjamin Pierce Auger Bits.	dis 35 1/2	
Gravold Auger Bits.	dis 40 1/2	
Cook's.	dis 40 1/2	
Jennings.	dis 40 1/2	
Bonney's Pat. Hol. Augers, list \$2 1/2 doz.	dis 20 1/2	
Stearns' Pat. Hol. Augers, list \$2 1/2 doz.	dis 20 1/2	
Belances.		
Light and Common.	dis 10 1/2	
Bells.		
Rev. Bros. Mfg. Co. Light Hand Bells.	dis 40 1/2	
Swiss Pattern Hand Bells.	low list dis 10 1/2	
Connell's Door Bells.	dis 30 1/2	
St. Western.	dis 30 1/2	
Boat and River Clippers.		
Chambers' No. 1, for 3/4 bolt.	each, \$7.50	
No. 2.	12.00	
No. 3.	12.00	
Boeing Machines.		
Upright, without Augers.	List \$ 50	
Angular, without Augers.	dis 33 1/2	
Bolts.—Eastern Carriage Bolts.	dis 60 1/2, cash	
Stanley Wrought Shutter.	dis 40 1/2	
Braces.—Barber's.	dis 40 1/2	
Backus.	dis 40 1/2	
Spofford.	dis 40 1/2	
American Ball.	dis 40 1/2	
Butts.—Cast Face Joint.	dis 20 1/2	
Broad.	dis 20 1/2	
Cast Loose Joint, Narrow.	dis 20 1/2	
Narrow, Fast.	dis 20 1/2	
Acorn, Loose Pin.	dis 20 1/2	
Mayer's Loose Pin.	dis 20 1/2	
Wrought Loose Pin.	dis 20 1/2	
Table Hinges and Back Flaps.	dis 20 1/2	
Narrow, Fast.	dis 20 1/2	
Loose Joint.	dis 20 1/2	
Blind Butts.		
Parker.	dis 40 1/2	
Clark.	dis 40 1/2	
Shepard.	dis 40 1/2	
Lull & Porter.	dis 40 1/2	
Hunter's.	dis 40 1/2	
Chains.—German Halter and Coll. new list Oct. 22.	dis 20 1/2	
Best Proof Oil Chain—English.	dis 20 1/2	
Best Proof Oil Chain—German.	dis 20 1/2	
Chisels.—Socket Framing.	dis 40 1/2	
Socket Framing.	dis 40 1/2	
Butcher's.	dis 40 1/2	
Cutters.—Bed.	dis 10 1/2	
Flat.	dis 10 1/2	
Coffee Mills.—Box and Side, new list Jan. 1.	dis 10 1/2	
Enterprise.	dis 10 1/2	
Cutlery.—Walden Pocket.	dis 10 1/2	
Goodnow Mfg. Co. and Meriden Cutlery Co., Manu.	dis 10 1/2	
facturers' prices net.		
Drawings Knives.	dis 10 1/2	
Hart Mfg. Co.'s.	dis 10 1/2	
Adjustable Handle.	dis 10 1/2	
Fry Pans.		
Tinned.	dis 45 1/2	
8 doz \$5.00 4.00 4.50 5.00 5.50 6.00 7.00 8.00 10.00		
Burnished.	dis 45 1/2	
8 doz \$5.00 3.75 4.25 4.75 5.25 6.00 7.00 8.00 10.00		
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Nicholson.	dis 20 1/2	
Diston.	dis 20 1/2	
Butcher.	dis 20 1/2	
Spencer.	dis 20 1/2	
Fluting Machine.	dis 40 1/2	
Eagle—2 1/2 in. roll.	each, \$2.15	
4 in. roll.	2.85	
Crown—2 1/2 in. roll.	2.85	
4 in. roll.	3.50	
Geneva Fluter.	dis 20 1/2	
Favorite com. Fluter & Sad Iron.	dis 20 1/2	
Hammers.		
Yerkes & Plumb, new list.	dis 15 1/2	
Hatchets.		
Yerkes & Plumb, new list.	dis 15 1/2	
Hunt.	dis 15 1/2	
Hinges.		
Strap and T.	dis 20 1/2	
Horse Nails.		
Ansable.	dis 20 1/2	
Blued and Pointed.	dis 20 1/2	
Globe.	dis 20 1/2	
Clinton.	dis 20 1/2	
Porter, all sizes.	dis 20 1/2	
Discount on Ansable and Clinton, 20 1/2; Globe, 10 1/2.		
Locks and K. knobs.		
Brando.	dis 30 1/2	
Gaylord Cabinet.	dis 10 1/2	
American Padlocks.	dis 10 1/2	
Scandinavian Padlocks.	dis 10 1/2	
Doors.	dis 10 1/2	
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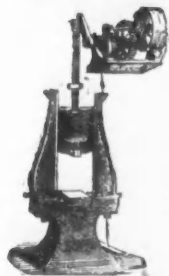
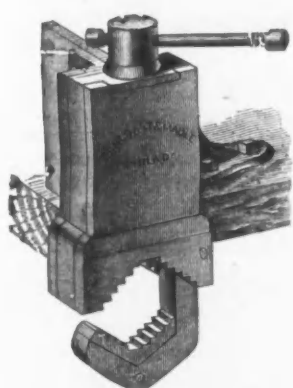
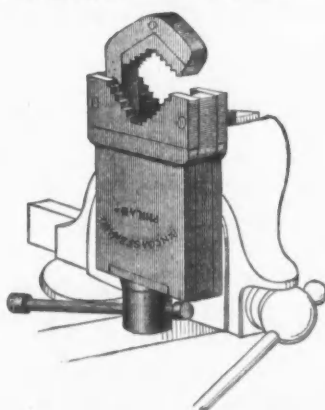
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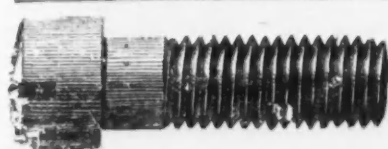
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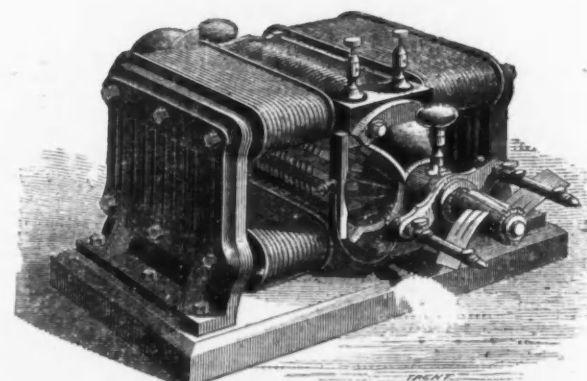
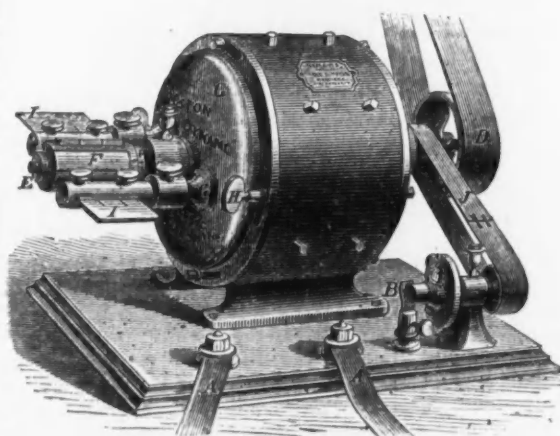
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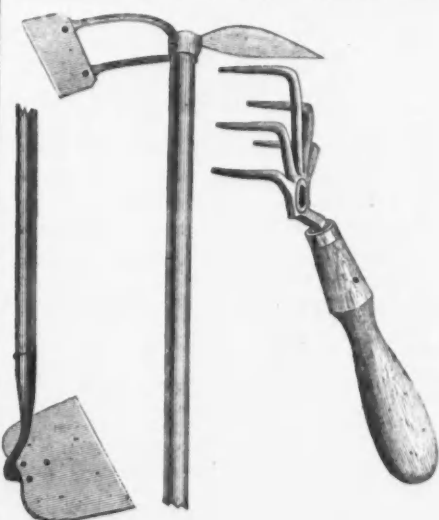
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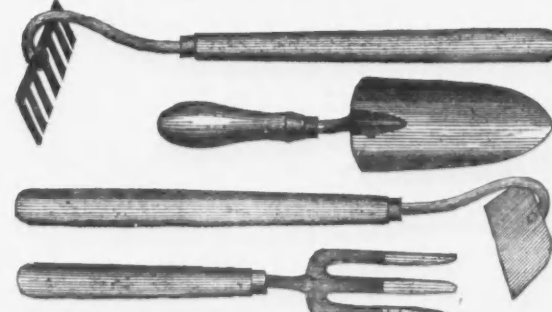
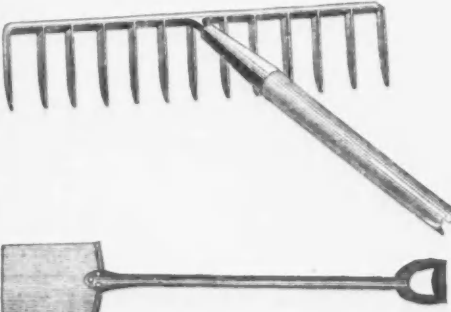
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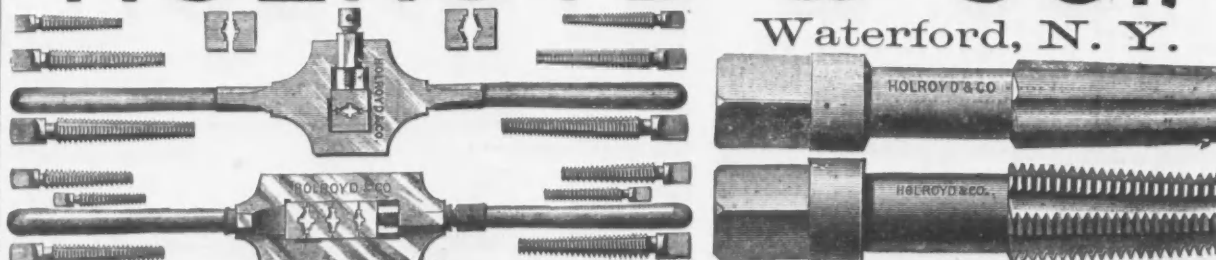
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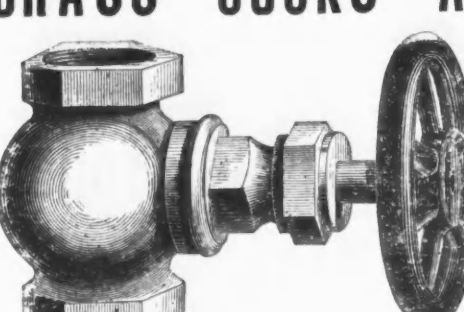
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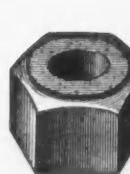
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I will send one on trial, to responsible parties,
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EVERY WRINGER WARRANTED.
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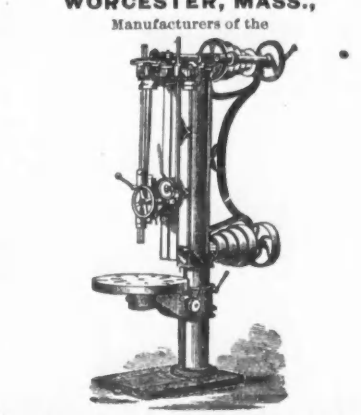
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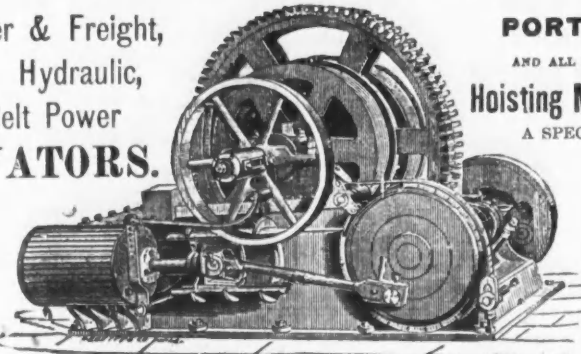


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" 31 in., No. B.....	per doz.	1.75
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" 31 or 34 in., No. C.....	per doz.	1.25
Axle Clips.....	per doz.	15.00
Bar Rail.....	per doz.	15.00
Cast Angle (for Anti-Friction Hangers).....	per ft.	40
Half-Round.....	per ft.	50
Wrought, per ft., No. 1.....	per ft.	75
Bells,—"Connell's Crank Gongs".....	per doz.	30.00
Blind Hinges,—"B. & D., reduced list, 1879".....	per doz.	35.00
Blind Fastenings,—"Lock Fastenings".....	per doz.	80.00
Boring Machines,—"Eagle Upright".....	per doz.	85.00
Eagle Angle.....	per doz.	4.00
Emil Augers.....	per doz.	2.70
Braces,—"Berger's".....	per doz.	40.00
Spofford's.....	per doz.	40.00
Bracket Saw.....	per doz.	40.00
Bracket Saw, extra quality, to No. 5.....	per doz.	60.00
Steel Frame, with pattern.....	per doz.	60.00
Leather.....	per doz.	25.00
New Rogers.....	per doz.	25.00
Bracket Saw Hinges.....	per doz.	75.00
Brackets,—"H. H. & E. Flower Pot".....	per doz.	35.00
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Bronze Hardware,—"Norwalk" New list.....	per doz.	35.00
Butts,—"Union Fast Joint".....	per doz.	10.00
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" 31 in., No. 6.....	per doz.	10.00
" 31 in., No. 7.....	per doz.	10.00
" 31 in., No. 8.....	per doz.	10.00
" 31 in., No. 9.....	per doz.	10.00
" 31 in., No. 10.....	per doz.	10.00
" 31 in., No. 11.....	per doz.	10.00
" 31 in., No. 12.....	per doz.	10.00
" 31 in., No. 13.....	per doz.	10.00
" 31 in., No. 14.....	per doz.	10.00
" 31 in., No. 15.....	per doz.	10.00
" 31 in., No. 16.....	per doz.	10.00
" 31 in., No. 17.....	per doz.	10.00
" 31 in., No. 18.....	per doz.	10.00
" 31 in., No. 19.....	per doz.	10.00
" 31 in., No. 20.....	per doz.	10.00
" 31 in., No. 21.....	per doz.	10.00
" 31 in., No. 22.....	per doz.	10.00
" 31 in., No. 23.....	per doz.	10.00
" 31 in., No. 24.....	per doz.	10.00
" 31 in., No. 25.....	per doz.	10.00
" 31 in., No. 26.....	per doz.	10.00
" 31 in., No. 27.....	per doz.	10.00
" 31 in., No. 28.....	per doz.	10.00
" 31 in., No. 29.....	per doz.	10.00
" 31 in., No. 30.....	per doz.	10.00
" 31 in., No. 31.....	per doz.	10.00
" 31 in., No. 32.....	per doz.	10.00
" 31 in., No. 33.....	per doz.	10.00
" 31 in., No. 34.....	per doz.	10.00
" 31 in., No. 35.....	per doz.	10.00
" 31 in., No. 36.....	per doz.	10.00
" 31 in., No. 37.....	per doz.	10.00
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" 31 in., No. 42.....	per doz.	10.00
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" 31 in., No. 59.....	per doz.	10.00
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" 31 in., No. 64.....	per doz.	10.00
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" 31 in., No. 95.....	per doz.	10.00
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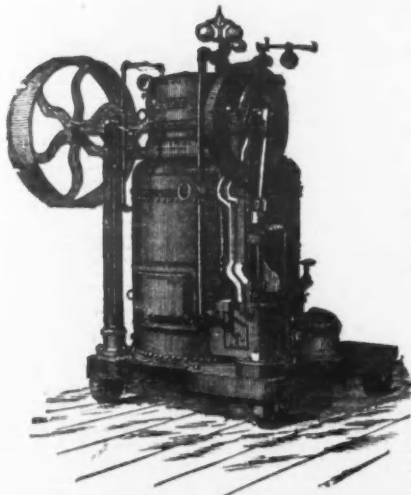


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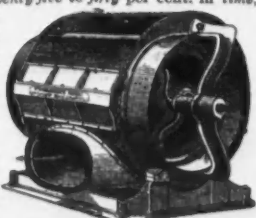
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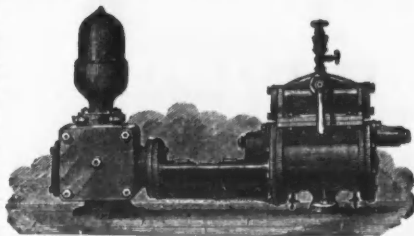
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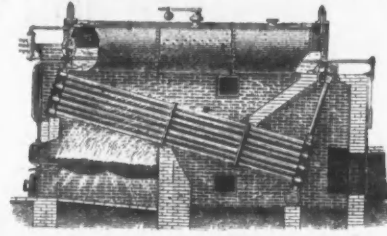
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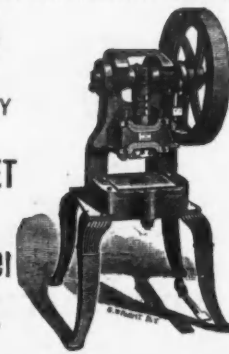
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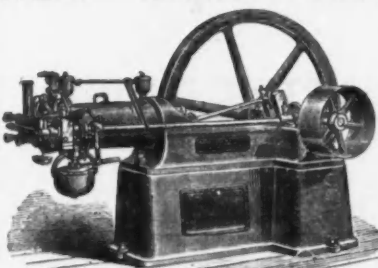
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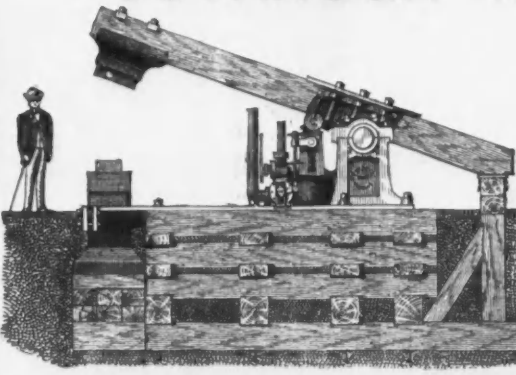
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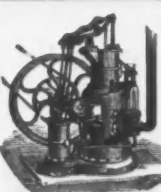
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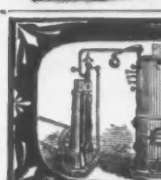


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Punching Presses, Hand Drilling Machines, Ratchet
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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying a Governor should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than is shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

Reduced Price List.

OCTOBER 15, 1878.

For dimensions of Governor, see Illustrated Price List.



THE JUDSON PATENT

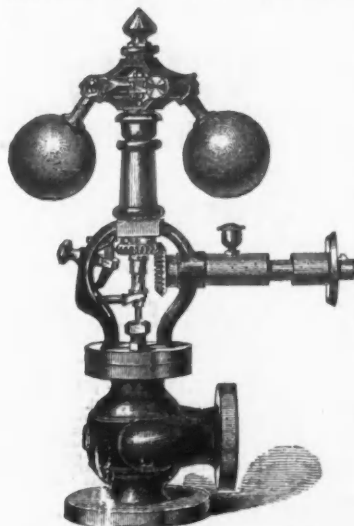
Improved Steam Governor.

No Charge for Box or Cartage.

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THE SHIVE STEAM ENGINE GOVERNOR.

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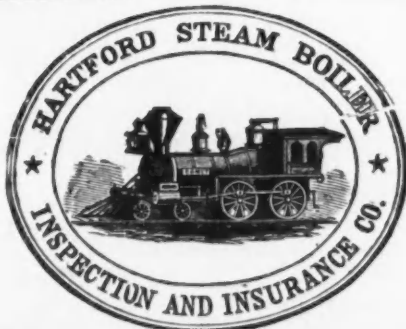


EXTRA FOR					
Size of Governor	Black.	Finished.	Ball and Lever.	Auto-matic Safety Check.	Stop Valve.
1/2 in.	\$16.00	\$18.00	\$1.00	\$2.25	\$4.00
1 in.	18.00	20.00	2.00	3.25	5.00
1 1/2 in.	20.00	23.00	2.25	3.50	6.00
2 in.	23.00	27.00	2.50	3.75	7.50
2 1/2 in.	27.00	31.00	2.75	4.00	9.00
3 in.	31.00	36.00	3.00	4.25	10.00
3 1/2 in.	36.00	41.00	3.25	4.50	11.00
4 in.	41.00	47.00	3.50	4.75	12.00
4 1/2 in.	47.00	53.00	3.75	5.00	13.00
5 in.	53.00	60.00	4.00	5.25	14.00
5 1/2 in.	60.00	68.00	4.25	5.50	15.00
6 in.	68.00	77.00	4.50	5.75	16.00
6 1/2 in.	77.00	87.00	4.75	6.00	17.00
7 in.	87.00	98.00	5.00	6.25	18.00
7 1/2 in.	98.00	110.00	5.25	6.50	19.00
8 in.	110.00	123.00	5.50	6.75	20.00
8 1/2 in.	123.00	137.00	5.75	7.00	21.00
9 in.	137.00	152.00	6.00	7.25	22.00
9 1/2 in.	152.00	168.00	6.25	7.50	23.00
10 in.	168.00	185.00	6.50	7.75	24.00

TO ALL WHO USE STEAM POWER.—We will put our Governor on any engine and warrant it to prove superior to all others, and to do all we claim for it. If, after a fair trial, it does not, we will take it off at our own expense. No charge for boxing. Manufactured by

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Works, Bethlehem, Pa., U. S. A.



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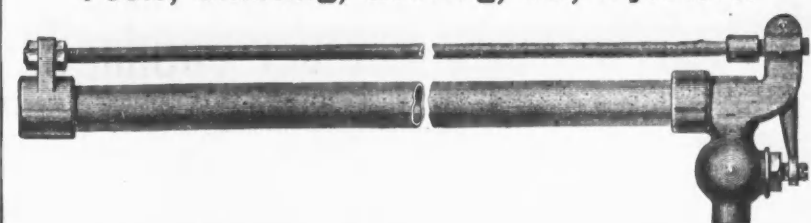
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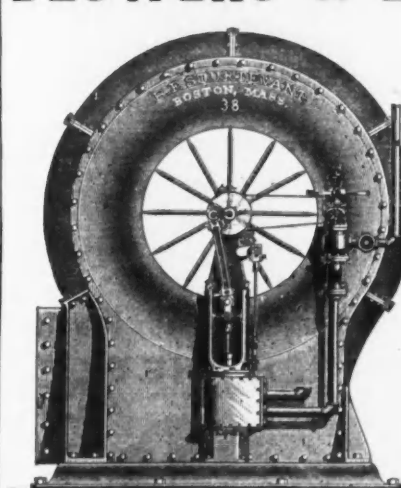
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For removing Shavings and Dust from Wood-Working Machines, Dust from Sand and Emery Wheels, and for Ventilation.

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Manufacture Improved

ROCK & ORE BREAKERS,



View of Rock Breaker.

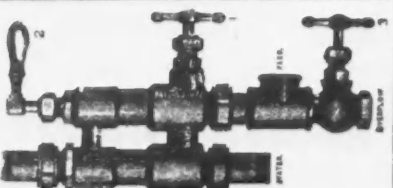
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